FIRST AERO WEEKLY IN THE WORLD

APR 18 1938

FLIGHT

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The AIRCRAFT ENGINEER AND AIRSHIPS

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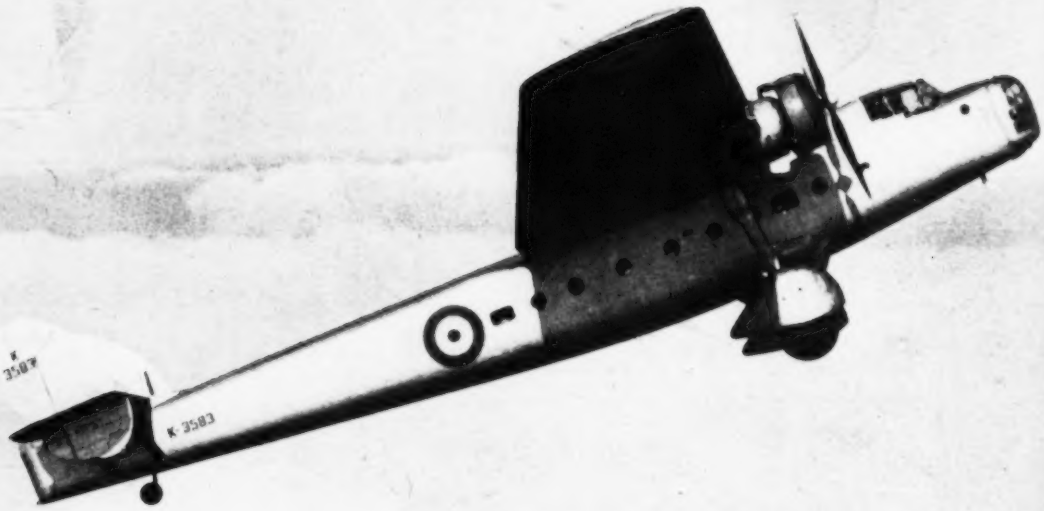

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FLIGHT

The AIRCRAFT ENGINEER AND AIRSHIPS

FIRST AERONAUTICAL WEEKLY IN THE WORLD : FOUNDED 1909

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The Outlook

Two Great Flights

BY a somewhat curious coincidence, the last two weeks in March saw two great flights accomplished, each of which was significant in its own particular way as an indication of what we may expect to see in the not-very-distant future. We refer, of course, to Clouston's and Ricketts' flight to New Zealand and back in the Comet and to the non-stop flight by a German crew in a Do. 18 flying boat from England to the coast of Brazil.

Clouston, who contributes an account of his experiences to *Flight* this week, demonstrated that, given a good, fast aeroplane and a determined crew, New Zealand is within little more than four days of London, and London but five days or so away from New Zealand. It may be argued that they were using a racing aeroplane, with no space for mails. The reply to that is that they were flying a four-year-old machine carrying fuel for more than 2,000 miles and driven by engines of very modest power output. From a technical point of view there is nothing difficult in producing, four years after the Comet, a machine with a good deal better performance and a very substantial pay-load. Thus, as soon as the Government decides to send letters to Australia and New Zealand by special mailplanes, the Clouston-Ricketts times could probably be maintained with fair regularity on scheduled flights. The Albatross, if it comes to that, is even more efficient than the Comet, power for power, and has room for passengers. A mailplane could be made a good deal faster.

The significance of the German flight from Start Bay to Caravellas lies in the fact that it was made possible by two diesel engines. As *Flight* has pointed out more than once, the main drawback of the diesel compared with the petrol engine is not so much its specific weight but its inability to give extra power for the take-off. With assisted take-off, be it catapult or composite, that disability loses its importance, and brings the diesel into the picture once more. But immediate and energetic action by the Air Ministry is essential if we are not to lag too far behind. No private firm can hope to tackle the problem without Government assistance. And the complacent statements made by Government spokesmen will not suffice.

When "That" is Not That

IN marked contrast to the alacrity with which it accepted most of the Cadman Committee's recommendations was the Government's heated refusal to make any changes in the Departments of the Air Members for Research and Development and for Supply and Organisation. In its hurry to get through what must have been a vast volume of evidence, the Cadman Committee blamed the system whereby R.A.F. officers of high rank hold the posts of A.M.R.D. and A.M.S.O. for transitory periods. The Cadman Committee was actually on the right track, but did not pursue the matter far enough. Lord Gorell, in a remarkable speech in the House of Lords on March 17, delivered an epigram which has some bearing on this point. "The trenchancy of the language" (of the Cadman Report), he said, "is in inverse ratio to the rapidity with which the decisions were reached." Had the Committee had a little more time, and had it been asked to examine the military side, it would probably have discovered that its general conclusions were correct, but that the trouble is not that there are serving officers at the heads of these two departments. Indeed, it is entirely logical that there should be. But the Government's "No" should not be accepted.

The real trouble is that there seems to be no one person in authority who can weigh the rival claims of smaller sub-sections and give a quick decision. The result is that there is clogging of the machinery and time is lost. One might quote many cases, but that of the so-called "mock-up" conferences, nicknamed "mock conferences" by the irreverent, will serve quite well as an illustration.

When an aircraft constructor (he is called a "contractor" by the Air Ministry) has obtained approval for a new design, he builds a fairly elaborate "mock-up" of the central parts of the machine. The "mock-up," it might be explained, is an affair in wooden frames, slats and brown paper or light three-ply, built to the full scale of the actual aircraft. In it the positions of engines, crew and equipment are fairly accurately represented by wooden dummies (except for the crew, who are represented by Air Ministry officials!). (*Continued overleaf.*)

Quart in the Pint Pot

ON the day of the mock-up conference, hordes of Air Ministry officials arrive at the works of the constructor. How many of the Directorates from the two Departments are represented will depend upon the circumstances. It might be explained here that the Department of the Air Member for Research and Development includes the Joint Directorates of Research and Technical Development; the Directorate of Armament Development (quite recently); Aeronautical Inspection, and Repair and Maintenance. The following Directorates come under the Department of the Air Member for Supply and Organisation; Organisation, Equipment, Works and Aeronautical Production.

What with representatives of Directorates and Deputy Directorates, it may be imagined that the party is a large one. Each official is there to see that his particular piece of equipment is placed in the most suitable position. It is but natural that he should be intent on having it put just where he knows it will work to best advantage. That by insisting on his point he may be pushing another and equally important piece of equipment into a place where it is cramped or inaccessible or liable to damage is no concern of his—naturally.

The blame does not lie with the present personnel, who are doing their level best to arrive at a workable compromise. The fault must be sought in the system itself, in the absence of a single man put in supreme authority to say to Mr. Soandso, "I am sorry, but your claims will have to take second place on this occasion, and the pink pills for pale people will have to go on the starboard side and Mr. Someonelse's oxygen bottle will go on the port side; it is more important."

At present the final decision cannot be given until long discussions have taken place, and the result is that exasperating delays occur. What is even worse is that sometimes the unfortunate constructor goes ahead with the building of the machine, and then certain changes are asked for which cause further delays. There is even a case on record in which the change demanded in armament equipment was such that the c.g. of the machine was moved too far back and the wings had to be given a sweep-back in order to bring the centre of lift into its proper relationship to the c.g.

Imperial Airways Apologia

THE letter from the secretary of Imperial Airways to the shareholders of the company is an apologia but not an apology. The said shareholders may be interested to note that practically every point made by the Board in this letter had already been put forward with emphasis by *Flight*, which, though no thick-and-thin supporter of Imperial Airways or of any other concern, is a whole-hearted lover of fair play.

We have always held and preached that it was the duty of Imperial Airways to earn revenue so far as was consistent with the safety and efficiency of its services, because it was incumbent on the company to hasten in all reasonable ways the time when those services could be run without a subsidy paid by the British taxpayer. New enterprises naturally needed new agreements and new subsidy arrangements. We have not been inclined to cavil at the policy of raising the status of the company by paying attractive dividends, provided that safety remained the first object and efficiency the second.

At one time we felt that Imperial Airways were too indifferent to the matter of speed, but since the orders for the Short flying boats and the Armstrong Whitworth Ensigns were placed, no very serious charge could be made. As we have said before, Imperial Airways cannot be blamed for the non-delivery of the landplanes at the time when they were required. Comfort, a matter of prime importance to passengers, has always been amply provided by Imperial Airways ever since the *Heracles* class was first ordered ten years ago.

Pretty well everybody is now agreed, and the Imperial Airways do not dissent, that the time has come for them to leave European services to some other firm.

Grid Cables : Commons Question

A MONTH ago we returned to a subject on which we had commented more than once in the past—that of the danger to aircraft caused by overhead electric power cables. We remarked that within the previous fortnight two more such accidents had occurred.

A little over a week ago—and within three weeks of our comment appearing—yet another accident occurred, a Service machine striking a cable when making a forced landing near Breich, Midlothian, and the two occupants being killed.

Meanwhile, shortly after our previous remarks, Rear-Admiral Sir Murray Sueter asked the Under-Secretary of State for Air in the House whether the possibility of putting wires underground had been considered. We did not want to lose a lot of pilots, he said, through their running into these wires. Was the Air Ministry consulted when new cables were put up? This was a very important question, because there would be more pilots flying about the country than ever before.

Lt. Col. Muirhead replied that the Air Ministry was in constant touch with the electricity authorities to see whether overhead wires could be put underground. "I may say," he said, "that our contact with the electricity authorities is very promising, and that, as far as possible, wires are placed on the ground."

After *Flight's* long agitation for some action it is gratifying to know that responsible authorities at least have the matter in mind, though (as is so often the case with Parliamentary replies) just how much the Under-Secretary's answer implies in the way of real activity it is difficult to assess.

Going to Earth

THE news of a delayed drop from 27,560 feet by a French parachutist, who did not pull his rip cord until within almost 1,000 feet of the ground, raises an interesting question if one asks "What is the use of such 'records'?"

It is generally agreed that crews escaping by parachute from a shot-down aircraft during war will be liable to be machine-gunned by the attacking aircraft, at any rate, if there is a prospect of a landing in their own territory.

The one possible means of escape is a delayed drop. Even though a diving aeroplane could easily catch up with the unfortunate parachutist (whose terminal velocity would never exceed about 120 m.p.h.) his body, turning over and over, would present a difficult target. Probably the enemy pilot would have little chance until the parachute opened, when he himself might be in danger from ground fire.

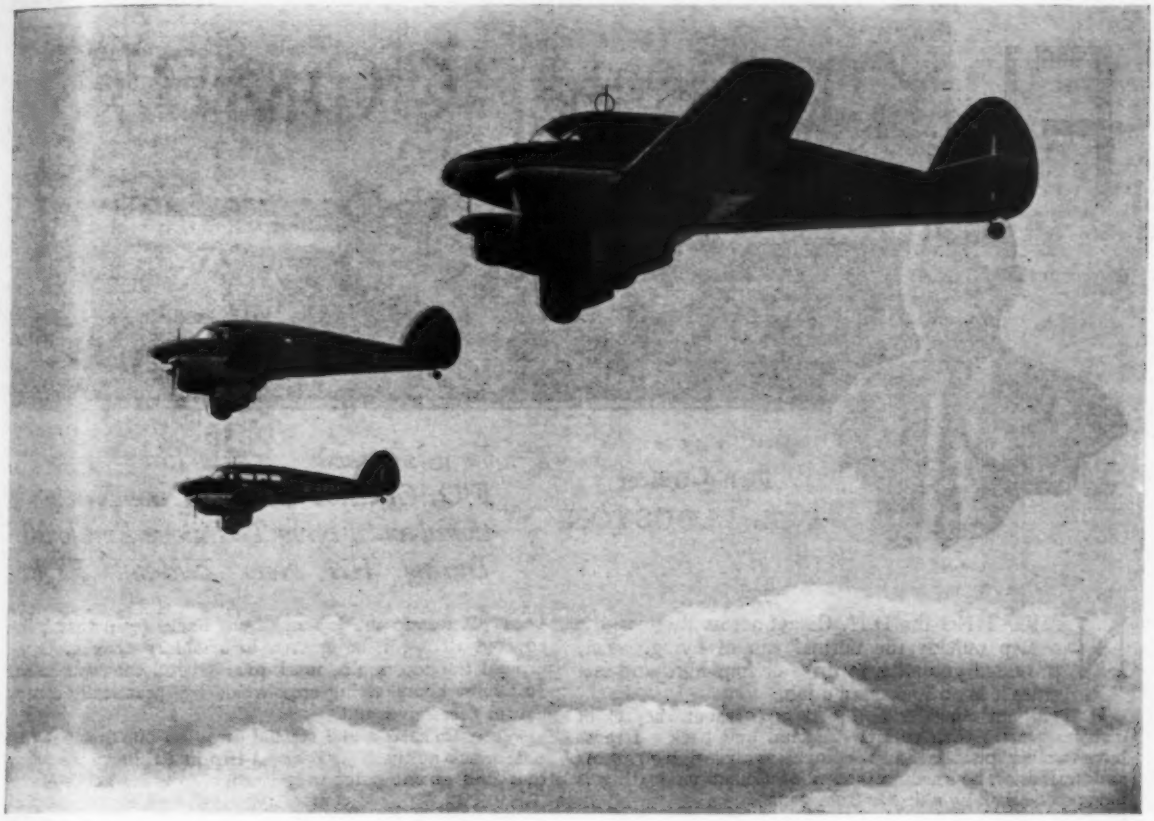
Unpleasant ruminations which, however, cannot be dismissed from the mind in these ominous times.

Army Pilots

MR. R. D. PERKINS, M.P., must have been in mischievous mood last week, when he asked in the House of Commons if the Under-Secretary for Air were aware that the appointment of an Army officer to command No. 4 Squadron had caused resentment in the Service. Such an idea is quite foreign to the spirit of the R.A.F.

It should be noted—though Mr. Perkins, according to *Hansard*, omitted to mention the point—that what he called No. 4 Squadron is officially named No. 4 (Army Co-operation) Squadron. The whole business in life of the army co-operation squadrons is to reconnoitre for the Army, spot for the Artillery, and on occasions to bomb and machine gun the land troops of the enemy. The officers of those squadrons are observers as well as pilots, and they have to undergo a very careful course of training in Army work at the School of Army Co-operation at Old Sarum.

It is only common sense that some officers of the Army should be seconded to these squadrons, and should receive temporary rank in the R.A.F. Actually, eight officers of the Army are thus commissioned in the R.A.F. every



CIVIL FORMATION: A pleasant impression of three of the new Percival Q.6 monoplanes, specially "posed" by their pilots for *Flight's* photographer. The nearest, which is painted flame and yellow, is for King Ghazi; next is the demonstrator; and third is Sir Philip Sassoon's. The Q.6 is a feeder-line, charter or luxury private-owner type, and is fitted with the Gipsy Six Series II.

year. Again, it is only in the normal course of events that some of them should rise to the rank of Squadron Leader and be given the command of squadrons. Of course, they are not eligible for employment in any but army co-operation squadrons.

It would be an improvement if the military rank of these officers were to be shown in brackets in the lists of squadrons in the *Air Force List*, as is done in the case of naval officers of Fleet Air Arm squadrons. The Army rank of the officers is only shown in the gradation list, and it would make the *Air Force List* more convenient if it were shown in both places. Perhaps it was this arrangement which confused Mr. Perkins.

To Strat or Not to Strat?

WHATEVER the conclusions that will be arrived at as a result of experience, the American experiments with "stratoliners," described elsewhere in this issue, are of great interest on this side of the Atlantic also. The new Boeings represent a compromise between what is immediately attainable without too much trouble and the ultimate gain which may be attained some day, when the technique is more developed.

Estimates from the Boeing engineers indicate that, on the score of performance only, the "Stratoliner" may or may not be worth while. Apparently the fully supercharged version is expected to cruise at 240 m.p.h. at 20,000ft., compared with the 215 m.p.h. of the moderately supercharged machine at 10,000ft. on the same power. The gain of 25 m.p.h. is worth having, certainly, but it may well be nullified by the increased strength of the headwinds at the greater height. With a tail wind the gain is, of course, well worth having.

It would appear that the greatest benefit is likely to come not so much from performance but from passenger comfort.

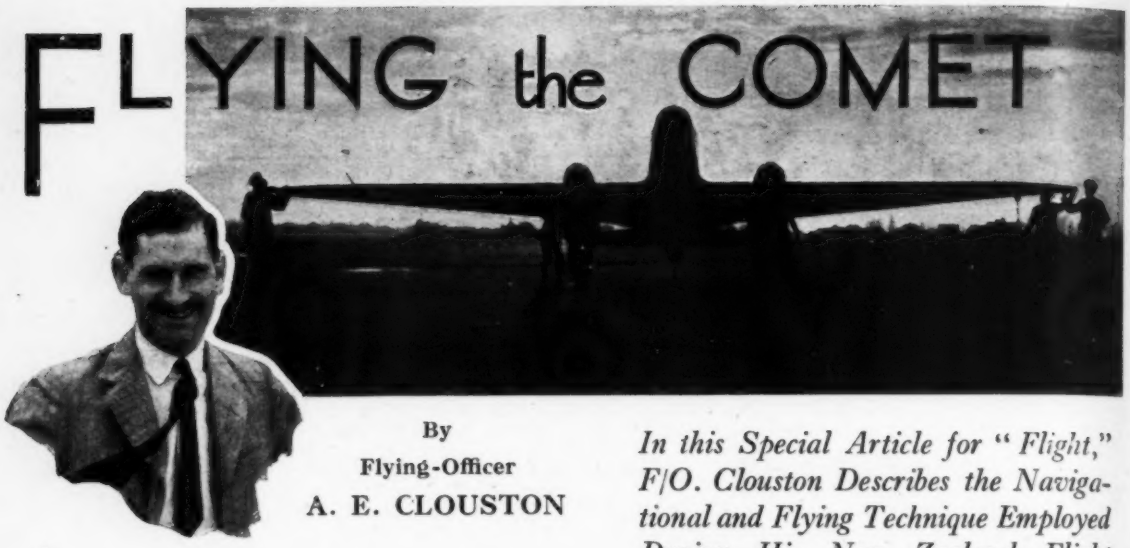
Over-Rumbling

QUITE apart from the fact that the modern design of transport aeroplanes makes at least a partially motored approach quite inevitable, the airline companies also feel that passengers are very much happier if the pilot keeps his throttles open until the machine has crossed the aerodrome boundary, or is, in fact, on the point of landing. Nevertheless, this much-discussed "rumble" technique seems to be overdone to an almost dangerous degree by the majority of transport pilots.

It is all very well and comforting to be brought in with a shade of motor, but it is quite a different matter when the machine is allowed to descend almost to the chimney-pots about half a mile from the aerodrome and is then flown level on about half-throttle for the rest of the distance. Such tactics cannot possibly be necessary with any machine, and are certainly more frightening to the inexperienced passenger than even the steepest approach.

Much of it is plainly the result of poor judgment or simple laziness, and the fact that the pilots of at least one Continental company usually manage to bring their unflapped machines in all the way through a half-circuit of the aerodrome without touching the throttle shows that such an approach can be made. We are not minimising the difficulty of judging an approach with a modern machine, or forgetting that a little engine is often necessary in order to retain full and efficient control, but the rumbling technique should involve a gradually and progressively reduced throttle opening, and not either a somewhat wild series of bursts or a powerful burst for the last ten or fifteen seconds while the undercarriage drags along the housetops. It would be more than unfortunate if any of the exponents of the level-flight-at-zero-altitude approach so much as touches one of these urban obstructions. In such circumstances everything would be set for a particularly grisly accident.

FLYING the COMET



By
Flying-Officer
A. E. CLOUSTON

In this Special Article for "Flight," F/O. Clouston Describes the Navigational and Flying Technique Employed During His New Zealand Flight

NAVIGATING the D.H. Comet across the world is a step outside the normal run of flying. Yet, provided you stick to three or four hard-and-fast rules it is no superman's job.

I would not consider taking it on without the set of instruments we took to New Zealand and back. I must have two big, plain-faced P.4 compasses aboard, well swung and tested. The cardinal secret of Comet navigating is never to deviate by a degree from your compass course.

I always keep my Sperry directional gyro set at 0. When you get tired after hours of blind flying the markings in degrees on the gyro become a bit blurred and impossible to keep a course on. The big, round 0 requires much less concentration. The particular Sperry we had in *Australian Anniversary* was the best one I've ever flown on. On the New Zealand trip it sometimes went two hours without resetting.

Besides the directional we carried two lateral Sperrys, all three being driven off the port engine vacuum pump. For safety, in addition, we had a Reid and Sigrist turn-and-bank indicator driven off an external venturi. There is safety in numbers. In the Comet, in really blind conditions, iced-up instruments mean jumping out.

I fly with two good watches on my wrists and an aircraft clock in the dash. One watch and the clock are set to G.M.T., and all navigation is timed on them. The other watch is set to local time, wherever I am.

The general scale of our maps was 16 miles to the inch, sometimes 63 miles to the inch, and across Australia and over the Tasman Sea my map and charts were scaled down to about 150 miles to the inch.

Now for nagivation itself. Working out the course from A to B, I take the direct bearing and mean variation, and set that course off on the compass. I have never yet allowed for wind drift in the Comet, not even when I have known there to be a strong cross-wind blowing. It has been my experience that meteorological reports of weather for 2,000-mile stretches at 7,000ft.—the Comet's operating height—cannot be trusted. The upper winds have always turned out to be different from the way they should have been. It was in the Johannesburg Race, 1936, that I discovered drift can be ignored in machines that cruise at around the 200 m.p.h. mark over several thousand miles. In twelve hours' flying cross-winds will practically always cancel themselves out.

When Ricketts and I started away on our first unfortunate crack at the New Zealand trip in February we found ourselves at one point over Europe 40 miles north of our course. We just kept to our compass course, and three hours later, after blind flying, we were 30 miles south of it.

I never correct such flying for drift—I wait for the correcting wind to turn up a little farther on. Whenever possible, I check up my position on definite landmarks like rivers, mountains and islands, and keep marking my position on my maps. At night, unless there is a strong moon, there is scarcely anything to be seen. Over 2,000 miles probably half of the course is under cloud. And, in any case, crossing a country like India by night brings up very little indeed to check your position on. Through the dark hours I just sit on my compass course, speed, height and time. I try whenever possible to schedule my refuelling stop for daylight. It is madness to go off for ten hours' flying and then expect to find an aerodrome in the middle of a strange country like Australia, Africa or India in the dark.

One should be able to owe accuracy in navigating to one's own confidence in course-keeping. Sometimes I have wanted to think my compass was out 20 or 30 degrees when mountains, or snow peaks, or islands sticking out of the sea have given me a cross-bearing a bit different from that which I had expected. But in every case I have stuck to my original course, and the good old P.4 has turned out to be right. I would trust a properly swung and adjusted compass for a month.

When I get a definite check by landmark (confirmed by a second check) I work out ground speed and keep on working it out. I keep applying the result of my little arithmetical sums to the distance still to go. Flying up to 1,600 miles across open sea, as we did to New Zealand, we found that wind direction as shown by seaspray was frequently

Between March 15 and 26 Clouston and Ricketts flew in the Comet from London to New Zealand and back, a distance of 26,500 miles in under eleven days, establishing ten records, official and/or unofficial.

SAYS CLOUSTON . . .

"It was in the Johannesburg Race, 1936, that I discovered drift can be ignored in machines that cruise at around the 200 m.p.h. mark over several thousand miles."

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"It is my opinion that one should on no account try to put the Comet down in a pretty three-point landing. It is the only aeroplane I know that must *not* be landed that way."

"We had one or two tastes of ice formation . . . In just over three minutes one thick, heavy bunch of cumulus clouds . . . ruined the aerodynamical qualities of the Comet, loading us with two or three inches of ice on wings and tail."

entirely different at our 7,000ft. We always kept to that height, no matter what storms lay in front. I only fly round cloud patches over land, and when I am fairly certain of where I am. If you begin to make five-mile detours over the sea your landfall after 1,000 miles may be very different from the one neatly drawn on your map.

We had one or two tastes of ice formation, the worst over the 1,000-mile desert stretch between Cairo and Basra. In just over three minutes one thick, heavy bunch of cumulus clouds over this stretch ruined the aerodynamical qualities of the Comet, loading us with two to three inches of ice on the wings and tail. The pitot head was frozen up, and the only instruments that continued to function were the Sperrys. When thus flying blind and iced-up, it calls for considerable concentration to keep level with no air-speed indicator to help.

In severe tropical storms and bumps at 200 m.p.h. blind flying instruments in the Comet are only just readable. Crossing the Timor Sea we were compelled, Sutton-harnessed as we were, to shield our heads from the roof with air cushions. Then at Charleville, Central Australia, two of the Qantas pilots told us they liked the Timor because there were no bumps to worry them there! Fortunate mortals, they fly with radio, and can, and do, detour twenty miles to get round a bumpy area, while poor record-breakers, if they would make their proper landfall, must plough straight ahead and take whatever's coming to them.

Landing the Comet is a matter to be dealt with in sequence. I like to arrive over my aerodrome and make four or five circuits before I land. It is not an easy aeroplane to see out of, and I like to have everything under control and observation.

First the engines are cut down to about one-third throttle, dropping speed down from 200 to about 130 m.p.h. Then the undercarriage is wound down. It takes 14½ turns of the handwheel to get the undercart extended, and the wheel can only be turned about a tenth of a revolution with each movement. It takes four or five minutes to do the job calmly and efficiently.

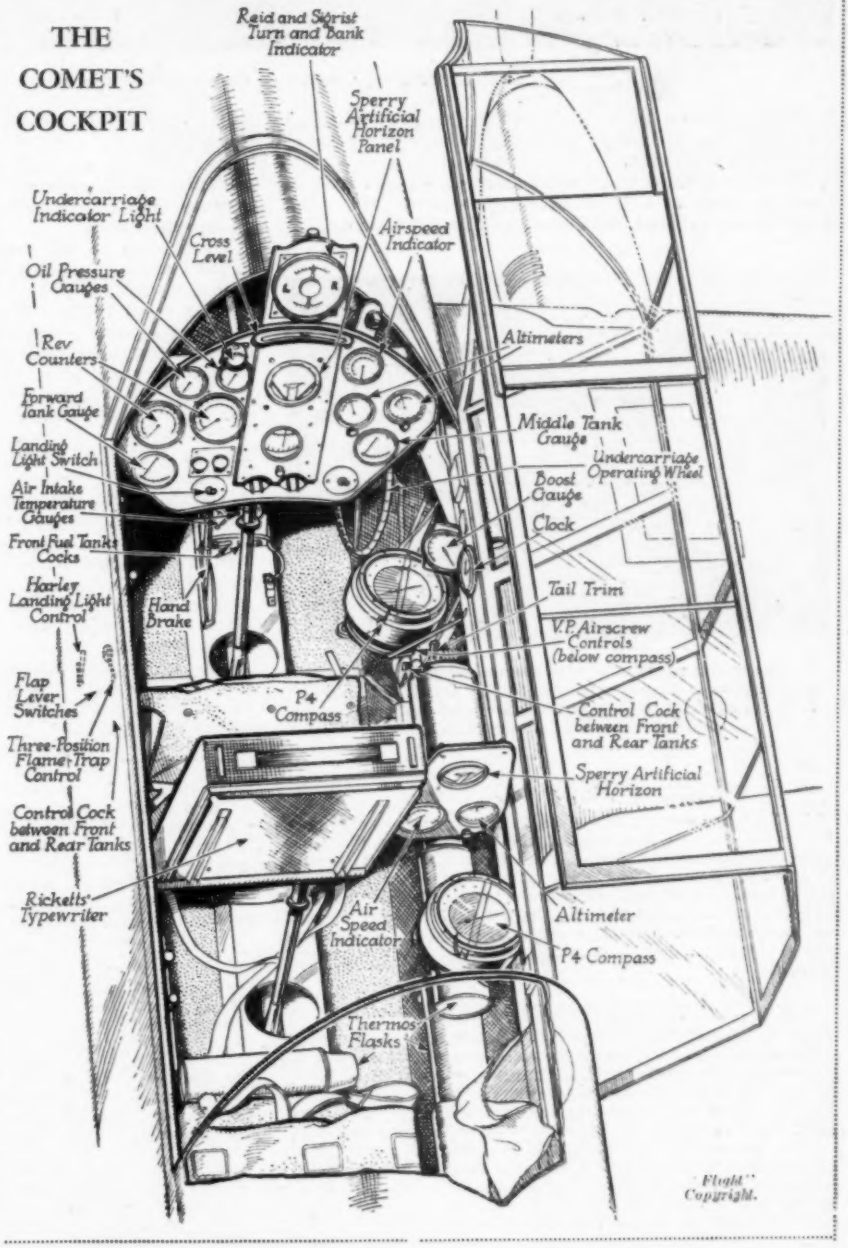
Next the airscrews are put into fine pitch, speed cut down again to 110 m.p.h. and the flaps brought on. They are intensely stiff, and take just about all your strength to bring down. Then round to land in a very wide approach turn with throttles half open. I take her round to have at least a mile in which to fly in to land at hot, sandy aerodromes.

It is my opinion that one should on no account try to put the Comet down in a pretty three-point landing. It is the only aeroplane I know that must NOT be landed that way. It must always be a slightly "wheel" landing. If a three-pointer is tried, the Comet won't sit down on three points; she will just balloon off into space again.

Landing is not easy, but taking-off fully laden from tropical aerodromes is a major problem. The machine is excessively tail heavy and very prone to swing. If it develops a good swing you catch it early with the motors and, if need be, the brakes as well. The fact that you can see nothing ahead adds to the difficulties.

The engines are opened to half-throttle to allow them to start turning evenly and get the machine rolling nicely, and then increased to wide open. Partial swings can be corrected, if you catch them in time, by juggling the throttles only. The brake lever is left a quarter on. The

THE COMET'S COCKPIT



This *Flight* drawing clearly shows the layout of the Comet's cockpit, and of some of the equipment carried during the flight. Both pilots wore Irvin seat-pack-type parachutes. There is a small luggage space behind the rear seat. The main fuel tanks (128 and 110 gallons) are in front of the pilot, and there is a 20 gallon tank aft.

"*Flight*" photograph

The Comet welcomed at Croydon on its return from the record flight.

brakes themselves are not working in this position unless the rudder bar is brought into play, when they work as another check on swing.

The tail will show no sign of coming up for two or three hundred yards, as full-load acceleration is so slow. But once the tail is lifted the Comet, as clean as a knife, has acceleration of a positively amazing order if it is held in flying position.

In spite of the apparent speed, it has to be held down the full length of the runway. If you try to lift it off before it is ready it will simply sit back again on its tail and slither—on into the hedge.

There is no normal sensation that you are about to fly as the Comet approaches the boundary. You must allow it to run and run until just before the hedge, when the stick is eased back. Then it will have attained about 90-95 m.p.h., and will fly off soggily. After the first upward climb it must be eased down slightly, and the airscrews put into coarse pitch after the undercarriage has passed the half-up position during retraction. And so up to 7,000 feet in a long, gentle climb at 140 m.p.h. on the clock.

Probably our most moving take-off was from Charleville, homeward bound. We had tanked up to 200 gallons for the hop across 1,700 miles of featureless Australian desert to Darwin, when closer inspection by car of the 830-yard runway caused me to order 40 gallons to be pumped out again.

Normally I must have 1,000 yards for safety, and in tropical heat something like 1,700 yards. With the 40 gallons removed we just cleared the hedge, after one second's suspense when the machine sank a few feet after being pulled off in the last five yards of available space.

An unorthodox snapshot of Clouston and Ricketts, amusingly suggestive of the famous painting, "The Death of Nelson." They are watching the Comet being prepared in the works of Essex Aero Ltd., at Gravesend.

Death of Major Colin Cooper

FLIGHT regrets to record that Major Colin Cooper, chairman of the Percival Aircraft Co., Ltd., and director of various other companies, died last week in Kisumu Hospital, Kenya, at the age of forty-five. During the war he served in the R.F.C. and R.A.F., and after the Armistice he was the first aeronautical correspondent of *The Times*. He was a most successful business man and made a large fortune, and he was also a notable all-round sportsman who kept his own pack of harriers.

Approved Airscrew Protection

DR. G. S. ADLINGTON, a London scientist, has perfected a new method of treating airscrews which, according to the Rayoid Manufacturing Co., Ltd., of 97, Lombard Street, London, E.C.3, who are marketing it under the name of Rayoid, "bids fair to prolong their life tenfold." The treatment has just passed Air Ministry tests at Farnborough.

Tests for abrasions, adhesion of the material to the wood, and for durability were made and it is claimed that flints ¼in. long, whirred by the airscrew from a tray beneath it, failed to make more than two small perforations after twenty-two three-minute runs during which the airscrew was revolving at 2,000 r.p.m. The material, the nature of which cannot be revealed, has been applied to a metal airscrew for flying trials, and other airscrews are on their way over from abroad for treatment. It is cut from a sheet and rendered plastic by a special process which takes only a few hours.

The Air Ministry has approved wooden airscrews covered with the material as suitable for use without metal sheathing on the leading edge.

G.E.'s Get Together

AT the first annual dinner of the recently formed Aircraft Engineers' Association, held in London on Monday, it was announced that the S.B.A.C. had informed the organisation that it would give "every possible assistance." This was particularly good news for members in view of the intention of the Association to create a fellowship which will be regarded as all-important in the filling of executive positions. A special examination would, of course, be necessary. Incidentally, it is stated that keen interest in the A.E.A. has been shown in the Service.

Speakers, apart from Mr. Weedon, chairman of the committee, were Capt. Paterson (secretary, A.E.A.), Mr. Mallobutt, Engineers Superintendent of Imperial Airways at Croydon, and Mr. Hayward, Chief Inspector of the same company.

THE FOUR WINDS

ITEMS OF INTEREST FROM ALL QUARTERS

MRS. BETTY KIRBY-GREEN has been awarded a special Segrave Medal in recognition of her Cape flight with F/O. Clouston last November.

K.L.M. have ordered two more Koolhoven F.K.43 trainers for their pilots' school, described in *Flight* of February 10.

The sixteenth French International Aero Show organised by the Association of Aeronautical Industries will be held this year at the Grand Palais from November 18 to December 4.

Richard Palmer, who designed Howard Hughes' record-breaking speed machine which reached 352 m.p.h., has taken up a position with the Vultee concern following the death of Gerrard Vultee.

The Air Ministry is buying land on the English side of the Solway Firth for aerodromes at Silloth and Kirkbride, Cumberland. Owners have been notified that early possession is required.

Mr. Douglas Fawcett, veteran owner of a Hornet Moth and inveterate mountaineer, intends to celebrate his imminent 72nd birthday by circling Mont Blanc.

Contests for petrol-driven model aircraft have frequently been held at American airports. Recent legislation regulates such contests for the safety of full-scale aircraft, the public, and the modellists themselves.

The Hamilton Standard concern and the Curtiss-Wright Corporation are believed to have been co-operating with the U.S. Navy in the development of reversible airscrews for restricting the speed of dive bombers.

A model of a Hawker Hurricane fighter monoplane (scale 1 in 24) has been acquired by the Science Museum, South Kensington. It is on view in Gallery VI, where it forms part of a series of models of recent British military aircraft.

"Flight" photograph.

MAKING WAY FOR THE YOUNG 'UNS: A symbolic picture of a new Miles Magister on a visit to one of the few R.A.F. stations with an Avro 504N still on charge. The 504 series (and later the Tutor) were, of course, in the very front rank of training aircraft. Even to-day the Tutor is finding wide employment, but will eventually be superseded by monoplane types.

The Air Ministry is experimenting with air-tight cabins for long-distance flying at great heights. This is of particular interest in view of the article on the new Boeing Stratoliner on page 343 of this issue.

To-night's R.Ae.S. lecture is by Prof. E. G. Richardson, B.A., Ph.D., D.Sc. His subject is "The Manipulation of the Boundary Layer." The lecture will be given at 6.30 at the Institution of Mechanical Engineers, Storey's Gate, London, S.W.1, and admission will be by tickets obtainable through members. The April 26 lecture (Dr. Bairstow), incidentally, is postponed.

The prototype Hanriot 220 twin-engined fighter, reported to have a maximum speed of 515 km.p.h., crashed recently. The pilot escaped injury, but the machine was badly damaged. Soon after taking off the starboard airscrew and reduction-gear broke away, and this caused the accident.

F/O. A. E. Clouston was a guest at the Livery dinner of The Worshipful Company of Coachmakers and Coach Harness Makers of London last Monday. In a speech he said that the all-wooden construction of the Comet gave it some claim to association with the coachmakers' work.

FASHION PARADE: Five new styles for the U.S. Army Air Corps. (Left to right) Lieutenant Colonel in dress uniform with cape which may be worn on any occasion; Captain, with special evening dress with black tie, tails, dark blue coat and trousers (gold braid on coat denotes that he is an aide to President Roosevelt); First Lieutenant in mess kit (informal evening, no tails); First Lieutenant in full dress (sabre may be fitted to belt for parade); and First Lieutenant in dress uniform (no belt).

Twenty-five Years Ago

(From "Flight," April 5, 1913.)

"They had not been up two minutes, however, when one of the inlet valves gave out, so Mr. Rainey's flight was somewhat curtailed. A new valve was soon fitted, and Fowler started off again, but his luck was dead out, as one of the connecting rods broke this time, causing him to make a somewhat hurried descent, at the conclusion of which he rolled into a ditch and broke one of the skids and a couple of chassis struts."

PRIVATE FLYING

P.O. AT ST. MORITZ: The Hon. Drogo Montagu sends this snap, which he took recently at the St. Moritz mountain airport. He says that the machine shown, Mr. Ian Walker's Vega Gull, was the first British privately owned aircraft to land there.

Topics of the Day

Subsidies Again

BELIEVE it or not, my comments last week were written before we had received the letter which headed the correspondence page, and this letter has merely served to harden my conviction that it really is time that something was done about the individual known as a P.P.O. For some curious reason no powerful personage appears to have thought, at least officially, of subsidising the owner, who, as I tried to explain last week, is the one person who has the best claim to assistance.

The clubs, of course, have made private flying and nothing should be taken away from them (indeed, more should be given), but these clubs must take a light rap on the knuckles because they have never done anything very much to encourage their members to buy their own aeroplanes. For immediate financial reasons it may even be possible that they go so far as to discourage their more enthusiastic members from spending their money elsewhere, but in the long run I doubt very much if, by constant encouragement to ownership, they would lose anything at all.

The more machines there are in the air or in the hangars at any club aerodrome the less likely is it that casual members or visitors will lose their enthusiasm. And nothing is so damping to this useful attribute as an atmosphere of plain inactivity.

It is the private owner who is, too, in the best position to obtain new converts. He or she meets all sorts of people outside the movement and can usually offer a trip at a moment's notice, whereas the visitor to a club may need to wait for a couple of hours until a machine or an instructor is free. Furthermore, the owner is likely to be going somewhere and will so give the newcomer an idea that an aeroplane is, quaintly enough, meant for travel and not merely for circling an aerodrome.

A few days ago I travelled north with an owner of one of those more luxurious and well-equipped American aeroplanes and at our destination we picked up a passenger and brought him back to London in about a quarter of the time it would have taken him by any other means of transport. There was a powerful following wind and our ground speed was about 165 m.p.h.; the weather was magnificent, and we flew at 6,000 feet, while the passenger read a book.

As it happened, the passenger was quite accustomed to this form of travel, but he might quite easily have been a stranger to it and in this case he could not fail to have been deeply impressed with the whole performance.

Costs

AS for loss of custom, the club will, perhaps, miss the small hourage subsidy which is now available, but will, presumably, still receive the sum for licence renewal, provided that the owner arranges for the necessary application through the club in which he is interested. It is from new licences and renewals that the major part of the subsidy grant is obtained, and the club is not, therefore, due to lose much.

Actually, the majority of club secretaries will tell you that money is lost rather than gained on flying beyond that immediately necessary for licence renewal and, nowadays, for the small flying subsidy. So that if all the members who would otherwise put in fifty hours a year or so in club machines bought their own, a club would surely have nothing to grumble about.

Of course, a lot of the silent opposition by instructors and others to ownership by their pupils is the direct result of their experience of the cost of running a machine. There is no doubt that this cost is quite a lot higher than that enthusiastically calculated beforehand.

It takes a really determined about-to-be motorist or aircraft owner to cook such figures with true innocence. Thereafter, having run the machine for a year or so, the average owner spends his time warning other pilots about the enormous outlay. Yet, curiously enough, very few of the pilots who have ever owned machines have ceased to do so, and a great proportion of the names on the list of British owners are those which have regularly appeared during the last four or five years or more.

Difficulties

NOT unnaturally, the average amateur pilot has always tended to make the layman feel that this flying business is all very difficult. That is the price he extorts for showing comparative originality in a world peopled by those who will only do things which are done by ninety per cent. of the population.

Then there is the effect of common usage and publicity. If there were ten thousand aeroplane owners and fifty fatal accidents every year, people would still buy and fly aeroplanes. Once a month, perhaps, the newspapers would publish some Air Ministry figures which would be as meaningless as those for road accidents issued by the Ministry of Transport.

The difficulty of navigating has always been grossly exaggerated and the layman visualises navigation as some sort of superhuman birdman instinct helped by a series of highly complicated calculating instruments. The instinct consists of nothing but the ability to check any particular landmark with the conventional hieroglyphics on a flying map; and the calculating instruments can be mastered in ten minutes with the help of a few simple diagrams to assist one in appreciating their actual functions. After these functions have been understood and the instruments used on a few dozen flights in fairly good weather, even this part of the business of navigation can be ignored and the drift effects guessed with sufficient accuracy.

There are people who will never learn to read a map. At least so I am told; I have never met anybody yet who, with a little application, has not been able to follow the very simple markings. Those who say that they "don't understand maps" really mean that they have never bothered to try to understand them. The most experienced of pilots is sometimes unable to recognise a particular landmark by reference to his map, but he knows there is nothing to worry about because some quite unmistakable one will turn up within the next five minutes. One is a little tense, perhaps, on early cross-country flights, but in due course it all becomes very much easier than the business of finding one's way in strange country on the road. INDICATOR.

THIS YEAR'S GLIDING CAMPS

Where and When "Live-in" Gliding and Soaring Instruction May be Obtained Both in This Country and Abroad

THERE must be many people who have thought of taking up motorless flying but, being somewhat out of touch with gliding activities in this country, do not know how to set about it, or what facilities are offered. They are mainly of two classes: those who want to fly but cannot afford to learn on aeroplanes; and aeroplane pilots who, after the first novelty has worn off, have found power-assisted flight rather boring, and seek new worlds to conquer. Either class could not do better than spend their summer holidays at one of the instruction camps which are being organised this year by the leading British gliding clubs.

In the March 24 issue the training process was described by "Bellerophon," and for the benefit of those who might have been intrigued by the idea of at least looking into the gliding business, here is a list of the courses so far announced for 1938:—

Where to Go

LONDON GLIDING CLUB: April 8 to 17, May 6 to 15, June 3 to 12, July 29 to August 12, September 9 to 18. The fees are: 11 guineas plus 1 guinea special membership for the August camp (14 days), 8 guineas plus 1 guinea special membership for the other courses. Further particulars can be obtained from the Secretary, London Gliding Club, Dunstable, Beds.

DERBYSHIRE AND LANCASHIRE GLIDING CLUB: June 6 to 19, June 25 to July 8. Fee: 12 guineas inclusive for each course. Particulars from Training Course Secretary, Brookside, Combs, Chapel-en-le-Frith, Derbyshire.

YORKSHIRE GLIDING CLUB: August 7 to 20. Fee: 12 guineas. Apply to H. T. Blakeston, Camp Secretary, Spellowgate, Driffield, Yorks.

MIDLAND GLIDING CLUB: Public Schools' Gliding Camp, August 13 to 21. Fee: 8 guineas. Apply to R. B. Durose, 1, Newhall Street, Birmingham, 3.

There are also two courses for advanced pilots only: at the Midland Gliding Club from April 15 to 24; and at the Yorkshire Gliding Club from July 24 to August 1. The latter will include aeroplane-towed launches up to heights where the rising currents under cumulus clouds are to be found; and a special machine with parachute, maps and barograph, will be available for cross-country flying. Among the participants will be a number of expert German soaring pilots, who will bring their own machines.

All these clubs employ experienced professional instructors. The charges they make for the courses cover not only flying instruction but also all meals, sleeping accommodation, and use of clubhouse.

Three countries abroad admit foreign pupils to certain of their gliding schools: Germany, Austria and Poland. The courses, for the most part, last between two and three weeks, and the charges vary with the nature of the course, and are, of course, lowest for beginners.

The German schools are at Grunau, in Silesia, where every stage of instruction is available; the Hornberg, near Stuttgart, which caters for advanced pilots; and the Griesheim school at Darmstadt, where all launches are by aeroplane-tow from the aerodrome. To join a German course, application must be made in the first place to the Aero Club von Deutschland, Berlin, S.W.11, Prinz-Albrecht-Strasse 5, Germany.

The Austrian courses are held in delightful surroundings on the Gaisberg, just outside Salzburg. They are for both elementary and advanced pupils, the launches being made from the bottom and top of the mountain respectively. The Anglo-Continental Express Co., Ltd., of 177, Regent Street, London, W.1, undertakes all arrangements at an inclusive fee for people going from this country to attend the school.

In Poland the gliding school at Bezmiechova, in the Carpathians, has lately come to the fore as a place where foreign pupils are made welcome. The cost of the long journey is offset by the modesty of the flying fees, and, once there, living is cheap. Permission to join this school should be obtained from Aeroklub Lwowski, Lwow, Dabrowskiego Nr. 2, Poland. But those who intend to go so far afield might prefer to do so in company, and Mr. R. B. Bucknell, of the London Gliding Club, has undertaken to put would-be gliding visitors to Poland in touch with each other.

A. E. S.

MODERN MODIFICATION

THE present owner of the one and only Dart Flittermouse, Mr. A. Carpenter, of Coventry, has made one or two interesting modifications to this machine, which will be remembered as a single-seat high-wing pusher monoplane powered in this case by a 28 h.p. Scott A.S.2 engine. He has moved the original undercarriage towards the rear, and has fitted a castoring nose wheel with as much as 6in. of shock-absorbed travel.

So far only straight hops have been made with the machine, but the take-off run with the new undercarriage appears to be of the order of 100 yards or so in still air. Apparently the owner hopes that a certain amount of real soaring flight will be possible in suitable regions—the machine has a 40-foot span—and it is interesting, where ground transport is considered, to learn that the machine can be rigged for flight, from the nacelle outwards and upwards, in an hour. The appearance of the nacelle, with its engine and airscrew, sitting somewhat forlornly on a tricycle undercarriage is a distinctly odd one, but if the front wheel was made steerable it might almost be possible to use it as a means of road conveyance!

This modified Dart Flittermouse has characteristics which lead its owner to hope that real soaring flight, with the 28 h.p. Scott engine switched off, will be possible in the right atmospheric conditions.

Private Flying

FROM the CLUBS and SCHOOLS

YORKSHIRE

ALTHOUGH there was not much doing up Yorkshire way and the gales of the equinox reduced flying, the month of March produced 105 flying hours. A social held on March 26 went off with great success.

BEDFORD

A considerable increase in the flying hours has been made possible by the fine weather. New members include Messrs. Guy Lee and F. R Barker.

REDHILL

For the week ended April 1 a total of 60 hr. 20 min. flying was logged. Mr. I. McRobert took his "A" licence tests, and Mr. Milburn made a night flight for his "B" licence. Several new members joined.

BORDER

The Border Flying Club is arranging a competition for clubs in Scotland and the North of England. Full details will be published later. The Fox Moth, recently acquired for charter work and joy-riding, will be ready after C. of A. shortly. Although the weather has not been quite so favourable as elsewhere during March, a total of 129 hr. 30 min. flying was logged for the month.

BOURNEMOUTH

Cross-countries were made to Southampton, Hayling Island, Shanklin and Salisbury, and a visit was paid in force to High Post Aerodrome Hotel for breakfast on Sunday last. The flying for the week ended April 3 made 24 hr. 30 min., although seriously inconvenienced by high winds. Mr. R. P. Bush made a first solo and several new members are embarking on a new training scheme.

HANWORTH

The club dance, which was held on Friday, April 1, was attended by approximately 120 members and their guests. The second Hanworth Dawn Patrol will be held on Sunday, April 24, and a luncheon visit will be paid to Redhill on April 17. First solo flights were successfully carried out by Messrs. Ellison and H. Behn, and new members included Messrs. Achei and Candry. A total of 67 hr. 40 min. was logged.

HAMPSHIRE

One and a half hours night flying was included in the total flying for March of 208 hours. During the month Mr. Clive Bayley qualified for his "A" licence and Mr. J. G. Willis made his first solo flight. Mr. G. H. Jackson has commenced his "B" licence tests. He made his first solo on December 18 last and had completed 100 hours solo by March 16. Three new members joined the club.

LONDON

While the flying times for the week ended April 2 totalled 91 hr. 35 min., the total time spent in the air during March was 393 hr. 5 min., showing an increase of 90 hr. 15 min. over that for the same month in 1937. Mr. A. R. Pilgrim completed the tests for his "A" licence, and Mr. B. Wardle made a night flight for his "B." Two new members were admitted.

PORTSMOUTH

During the week ended March 31 the Portsmouth Aero Club put in 23 hr. 50 min.'s flying, while the total for the month was 125 hr. 45 min. Ten new members joined. The week's work included night-flying instruction and two night flights were made to Southampton and Croydon. Mr. P. R. Hornidge completed his "B" tests, and Messrs. G. H. Woodhouse and R. T. Boyd finished their instructor's courses. First solos were made by Sir Norman Pringle, Bt., and Mr. Didar Singh. Lt. Cdr. W. L. M. Brown, R.N., completed his "A" tests.

MARSHALL'S

Prospective visitors will be glad to hear that the new Airport Hotel is now open Flying was well up to average for last week, totalling 50 hours, and several visitors dropped in. Mr. G. L. Panes made a satisfactory night flight and completed cross-country tests for his "B" licence.

C.A.S.C.

The return of the very high winds last week-end meant that the Corps' flying times at Cambridge were reduced to a total of four hours and caused the cancellation of the proposed cross-country flight to Maylands aerodrome. Mr. Peters made his qualifying test flight for probationary membership.

NORFOLK AND NORWICH

Although very rough winds rather handicapped flying, cross-countries were made to Sywell, Reading and Shoreham and 23 hours were logged for the week. A demonstration of the Wicko monoplane was made and, in spite of the high winds, members had an opportunity of flying it themselves. A large party from Carrow Works were shown around the clubhouse and hangars by Councillor A. E. Nicholls, and a wrestling display was held on Wednesday evening.

PENANG

Preparations for the annual air rally rather tended to lower the flying hours for February at the Penang Flying Club, but a total of 105 hr. 10 min. was recorded. A visit was made by two Vickers Vildebeests of No. 36 (T.B.) Squadron, bringing with them representatives of the R.A.F. Singapore and the Fleet Air Arm to make final arrangements for the air rally. Tests for the Straits Settlements "A" licence were completed by Messrs. T. D. Shephard and D. MacLachlan.

CINQUE PORTS

Members have kept up a steady average of flying hours. Mr. Sharples went solo on Monday and completed his "A" licence tests on Thursday, after only a fortnight's tuition. Meanwhile Mr. Robertson has completed his "B" licence tests. Messrs. Du Port, Thyne and Miss Y. Staples Smith made a successful raid on Brooklands for their Dawn Patrol after battling with considerable headwinds. Mr. C. W. A. Scott visited the Cinque Ports Flying Club on his way to Antwerp on March 26, and again on his return on March 29.

BROOKLANDS

Forty machines from Broxbourne, Redhill, Reading, Croydon, Leicester, and Nottingham participated in the Dawn Patrol last Sunday. The defence of thirteen machines accounted for all but six of the "raiders." During the afternoon the Cub was demonstrated by Mr. P. B. Elwell. A luncheon visit was made to Reading by four of the club's aircraft, and next Sunday a similar visit is planned to Hanworth. A marriage has been arranged between Mr. Roland Morris, an instructor at Brooklands, and Miss Hilary Hallom, a club member. Royal Air Force support has been granted for the annual At Home to be held on June 18.

JOHANNESBURG

Flying times for February, 1938, amounted to 680 hours, which constituted a new club record and included cross-country flights to Durban, Molteno, Bloemfontein, Lydenburg and Potchefstroom. Nine aircraft visited Barberton and gave a display of aerobatics, witnessed by an immense throng of people. A fancy-dress dance was held at Baragwanath on February 5 and was attended by nearly 170 members and guests. Extension of the aerodrome has been sanctioned and a new hangar is already in course of construction. Miss Betty Trew and Mr. Becker were enrolled as new pupils, while Messrs. Fagan and Davison obtained their "A" licences. Solo flights were performed by Messrs. Ford, Rautenbach, Fagan, Townshend and Currie during the month. A Fox Moth has replaced a Gipsy Moth in the club fleet.

Ramsgate Again

ONCE again a holiday flying camp is being organised by the Straight Corporation at Ramsgate Aerodrome. The scheme involves camp life on a comparatively luxurious but inexpensive scale, and the cheapest "A" licence course is that with the Hillson J.A.P., for which £12 10s. is estimated for a pupil of average aptitude. Other machines, including a Miles Magister, will also be available.

The Ramsgate Flying Centre, as it is called, will open on June 4 and will be in operation until September 17. It will also be available to visitors for a week at Easter.

Dunstable Exodus

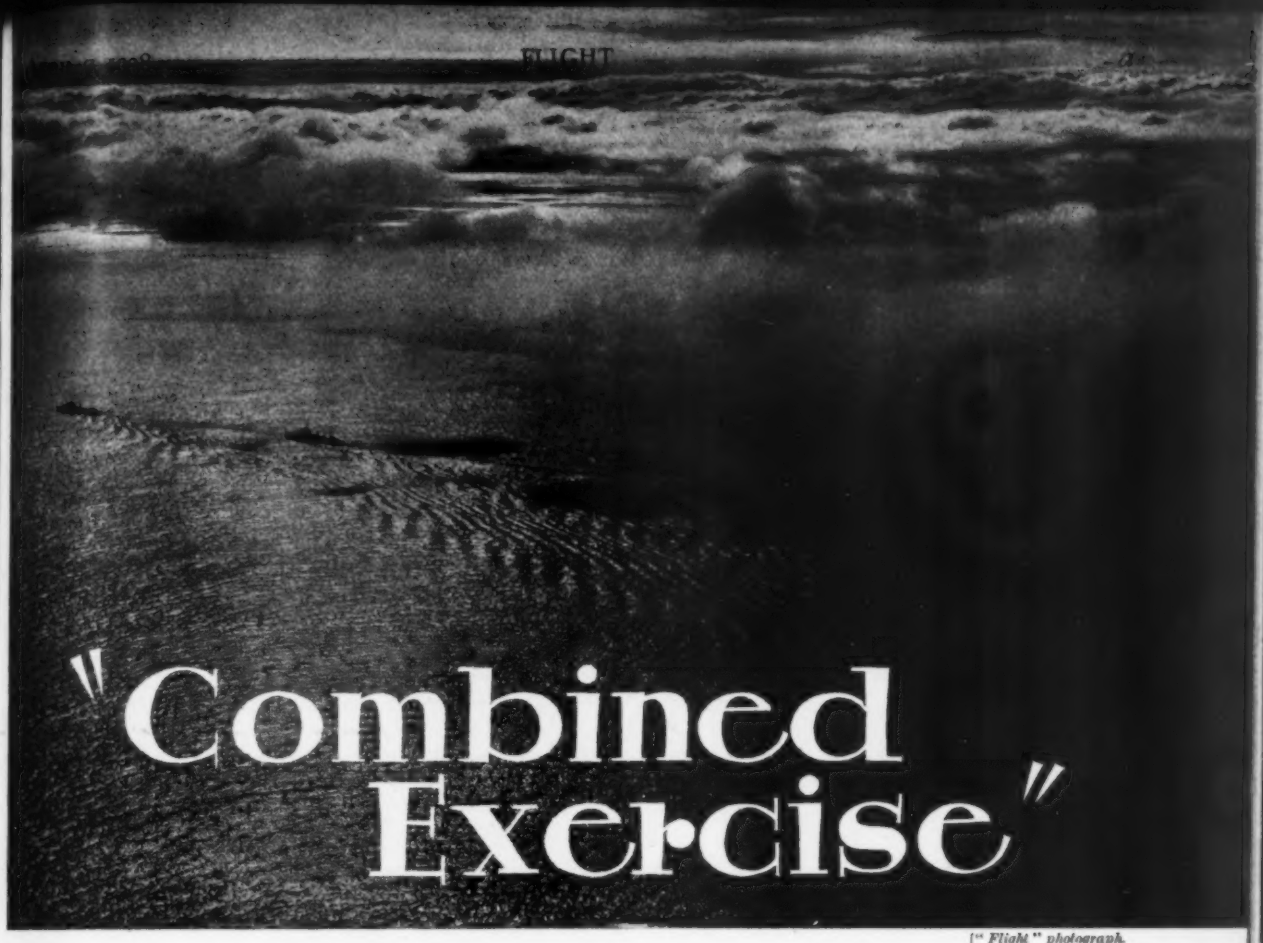
FOUR cross-country sailplane flights, the first this year, were made from Dunstable last week-end. The conditions were good, with a north-west wind at 20 m.p.h., and lift was so strong near Hatfield that pilots had difficulty in getting down.

Dudley Hiscox, in his Kirby Kite, went away immediately after the launch, making for the road junction beside Hatfield Aerodrome, where there is, apparently, always a thermal. Aeroplane pilots have noticed the permanent bump just about this spot. He landed at Hornchurch aerodrome, 39 miles away, having arrived there with 3,000ft. in hand.

Philip Wills, giving his new Minimoa its first test flight in this country, landed near his own house at Hemel Hempstead. John Dent flew the grey Kite 81 miles to a village near Ashford in Kent. The last to depart was J. S. Sproule, in a Grunau Baby, who did not want to fly over London without maps or compass and landed on Hendon aerodrome where he had arrived with 4,000ft. in hand, the distance being 22 miles.

The Marendaz Monoplane

IN addition to the machines included in the review of light aircraft in the issue of March 24 is the Marendaz monoplane, details of which were not received in time. Such information as is at present available about this new type was previously given in the first of our two British Aircraft Industry Numbers, while the new flap gear developed by the manufacturers, International Aircraft, Barton, Beds, was described in the issue of May 13 last year.



"Combined Exercise"

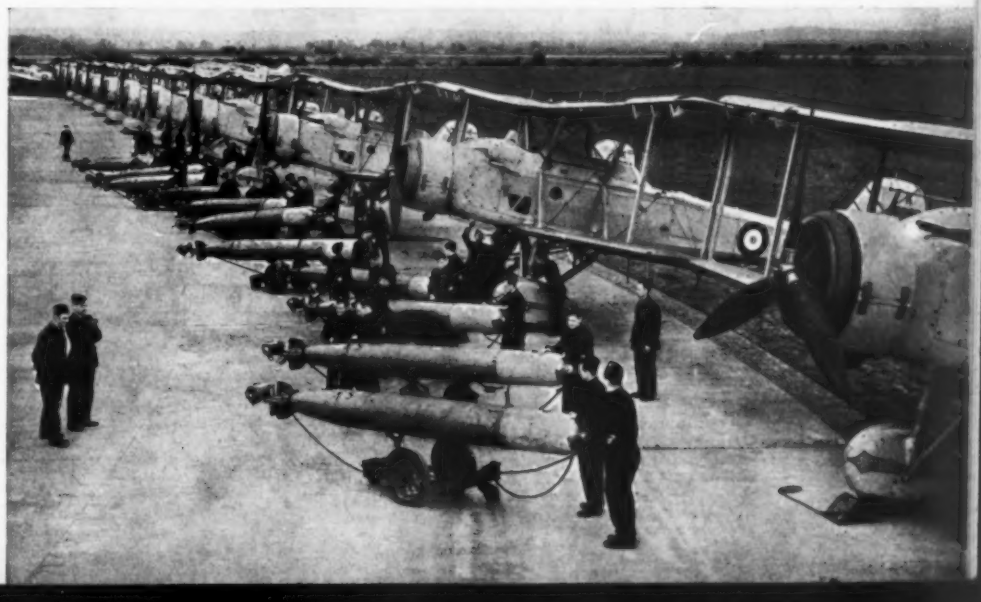
["Flight" photograph.

Good Work by Flying Boats and Ansons in Two-day Operations : Bombing a Convoy

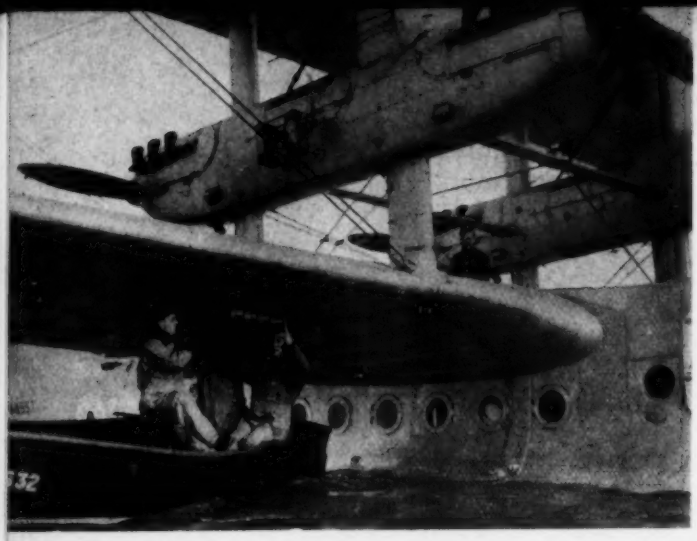
A FASHIONABLE diversion is debating which is the funnier: Shakespeare's "other Eden, demi-paradise," or "this fortress, built by Nature for herself." The beauty of a southerly trip for last week's combined air and naval exercise assuredly justified the Bard in the first of his metaphors, and the exercise itself showed how the R.A.F. could exploit our natural advantages.

The manœuvres started early last Monday week during the latter stage of the Home Fleet's homeward passage from Gibraltar, and took the form of a convoy exercise, the object of which was to make a theoretical attack on the Isle of Wight. Operations were confined to the western part of the Bay of Biscay, north of latitude 43° N., and the western part of the English Channel. Chief among the objects were the carrying-out of air reconnaissance speedily enough to send submarines against a fleet at sea; the exercise of shore-based aircraft in locating and shadowing a fleet; and the attack on a fleet by aircraft and M.T.B.s.

It is customary before all such exercises to draw up an inoffensive "general idea," followed by a "special idea," the preparation of the former being made with the official tongue dug well into the official cheek. Briefly, the idea (general) was that relations between Redland (North Coast of Africa) and Blueland (Spitzbergen) had become extremely strained. Redland had constructed naval bases in the Island of Biscay at Port Solony (Lat. 45° 40′ N., Long. 09° 10′ W.) and Port Juju (Lat. 48° 00′ N., Long. 07° 50′ W.). The Isle of Wight was a Blueland colony with a weakly defended naval base. A treaty with England had allowed Blueland to establish aerodromes along the South Coast. It was found necessary to assume that the Blue main naval forces could reach the Isle of Wight from Spitzbergen on April 10. Blue intelligence reports indicated that an expedition on a large scale was being rapidly prepared in the Red port of Arzen, and during the night of March 26-27 a fast Red convoy, escorted by



Bristol Perseus-engined Vickers Vildebeest IV torpedo bombers of No. 42 (T.B.) Squadron, the first standard military aircraft to be fitted with sleeve-valve engines and detachable-blade wooden airscrews. They are seen at Thorney Island, complete with "tinfish."



Light bombs on a Kestrel-engined Singapore III, a type used extensively by Blueland for long-distance reconnaissance.

a strong force of warships, slipped through the Straits of Gibraltar.

All of which was, according to the "special idea," to cause Blueland to send out reconnaissance aircraft as soon as the Red force came within range. The intention was that the force, once located, should be shadowed until the end of the exercise. Attacks on the transports would be made by Blue submarines operating on reports from Blue aircraft. Further attacks were to be made by torpedo bomber and general reconnaissance aircraft (acting as bombers), as well as by fast motor torpedo boats.

As things worked out, some of the world's mightiest battleships—*Nelson* (Flagship), *Rodney*, *Royal Oak*, *Revenge* and *Ramillies*—were called upon to represent the transports. Proximity to "Pompey" doubtless softened the blow for the matelots. The escorting force comprised the aircraft carrier *Courageous*, the cruisers *Southampton*, *Newcastle*, *Sheffield*, *Glasgow*, *Cornwall* and *Aurora*, and the Fourth, Fifth and Sixth Destroyer Flotillas. *Courageous* was carrying thirty-six Swordfish torpedo spotter reconnaissance machines and twelve fighters (Ospreys and Nimrods); seventeen Walrus spotter reconnaissance amphibians could be catapulted from other vessels.

The Defensive Force

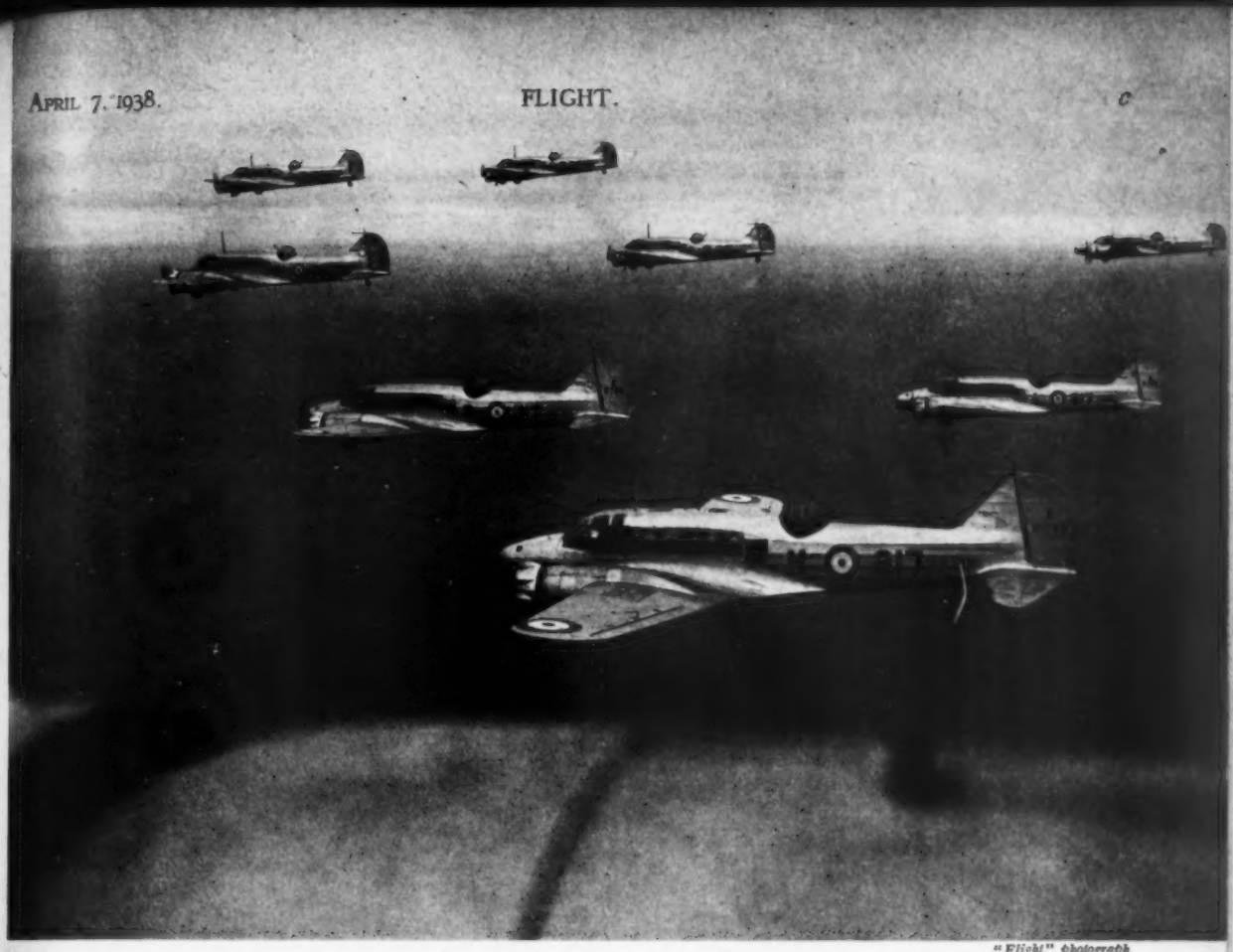
Blueland was apportioned ten submarines of the Second, Fifth and Sixth Flotillas, three destroyers, and two of the new torpedo boats by way of surface craft, and a comprehensive air force composed of the following units:—

Unit.	Type of Aircraft.	Aerodrome.
No. 22 (T.B.) Squadron ...	Vildebeest ...	Thorney Island.
No. 42 (T.B.) " ...	Vildebeest IV ...	Thorney Island.
No. 201 (G.R.) " ...	London	Mount Batten.
No. 204 (G.R.) " ...	London	Mount Batten.
No. 206 (G.R.) " ...	Anson	Thorney Island.
No. 209 (G.R.) " ...	Singapore III ...	Calshot.
No. 210 (G.R.) " ...	Singapore III ...	Falmouth.
No. 217 (G.R.) " ...	Anson	Tangmere.
No. 220 (G.R.) " ...	Anson	Exeter.
No. 228 (G.R.) " ...	Stranraer ...	Mount Batten.

We drove in at Lee-on-Solent, headquarters of the Blue Air Force, on Monday morning and learned that at 03.30 hrs. three Supermarine Stranraers of No. 228

No. 217 (G.R.) Squadron (with "Flight" represented in the leading Anson) slips past the Casquets on its way to make a low bombing attack on the convoy, which it found about 120 miles from the nearest land.

"Flight" photograph.



"Flight" photograph

The fifteen Ansons of No. 217 Squadron flew in a formation intended to provide concentrated protective cross-fire. It will be gathered that outlook from the Anson is extraordinarily good.

Squadron and two Saro Londons (210 Squadron) had taken off from Plymouth Sound under orders to set a course for Ushant, whence they were to diverge fanwise to the south-east to hunt for the enemy. Radio communication was forbidden until the convoy was sighted; even then reports were to be abbreviated as much as possible so that the enemy should not take bearings of the signals. On receipt of the report all aircraft then at sea were to close in on the spot indicated.

Finding the Fleet

After a failure to break through the clouds towards Ushant, the plan to check the course over that port was abandoned. Position was estimated by dead reckoning, and a new course set over the Bay of Biscay so that when, at 07.07 hrs., a lucky London spotted a pair of cruisers through a gap in the clouds about 200 miles south-west of Ushant, there was some difficulty in reporting the precise position. Subsequent checking revealed an error of about thirty miles in the first calculation. The main convoy was located at 07.19 hrs., so it seems that the cruisers were in the vanguard.

Taking up a position a few miles astern and dodging behind cloud banks, the London dogged the Fleet, which was steaming at 15 knots, until ordered to return to its base, where it alighted at 13.30 hrs., having covered 1,000 miles. As the enemy force entered the Channel approaches it was kept under observation (except for a few hours during the night) by other flying boats. Singapores, incidentally, kept up a nocturnal patrol.

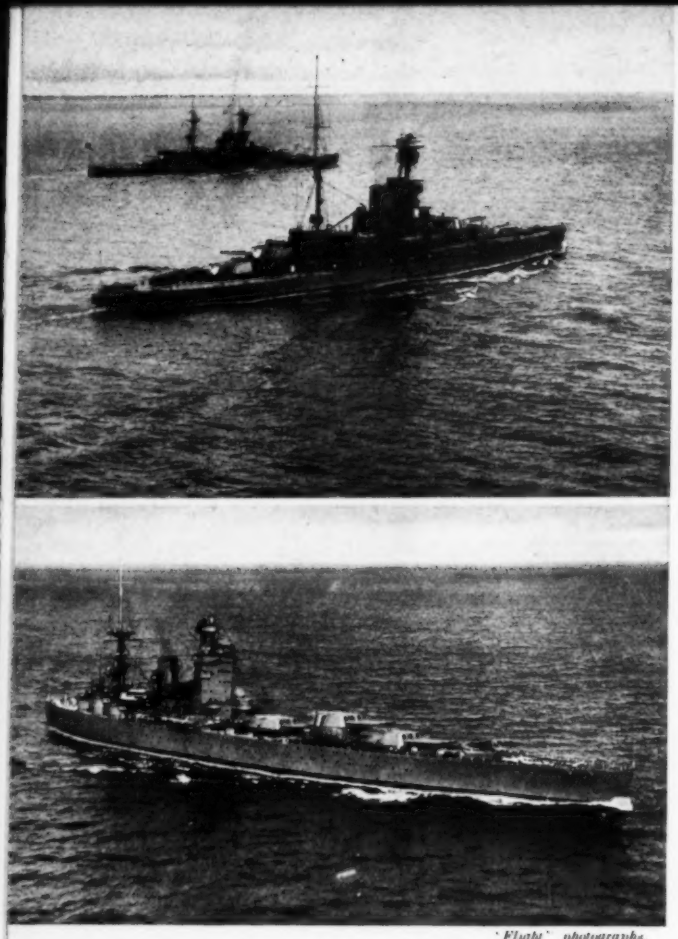
No Blue aircraft were operating from Lee-on-Solent, so in the afternoon we dropped in at the magnificent new aerodrome at Thorney Island to see the Vildebeests of Nos. 22 and 42 (Torpedo Bomber) Squadrons and the Ansons of No. 206 (G.R.) Squadron. No. 42 is armed with an improved version of the Vildebeests, the Mark IV, which is powered with the medium-supercharged Bristol Perseus VIII sleeve-valve engine driving a three-bladed wooden airscrew with detachable blades. The fifteen machines of this unit had been "dressed" in one of the most impressively correct parades imaginable, the perspective being accentuated by the line of red-nosed dummy-headed torpedos, all slung at precisely the same angle. The canister on the stern of these dummies, by the way, is a magnesium flare, which assists in locating the expensive "mouldy" after an attack. Blue-nosed Ansons were basking in less formal array on the aerodrome, and the Pegasus-engined Vildebeests were in various stages of preparation.

And so eastwards to Tangmere, near Chichester, where non-combatant Furies were disporting themselves in the style one will always associate with their kind. Fifteen squat Avro Anson general reconnaissance monoplanes of No. 217 were lined up by flights. It was this unit which was to adopt us for the remainder of the exercise.

The squadron was under direct orders from H.Q. at Lee-on-Solent, where Blueland's aerial operations were controlled by the A.O.C., No. 16 (R.) Group, Air Vice-Marshal H. M. Cave-Brown-Cave. The station commander, Group Captain K. R. Park, had that afternoon made a tour along the coast in the station Magister, and told us of some of the preparations, as well as giving an admirable exposition of the part to be played by the Ansons. Later Sqn. Ldr. Humphreys acquainted us with further aspects of the squadron's part.

"Courageous" Out

It was at first believed possible that "217" might be called upon to make a night reconnaissance, and it was while discussing such possibilities in the mess that we heard over the radio news of the tragic accident to a reconnoitring Stranraer. Later a report came through that *Courageous* was no longer participating in the exercise, which meant that our efforts on the morrow would not, at least, be hampered by Ospreys and Nimrods. Just before midnight the squadron learned that it would not be required for duty until, at the earliest, six next morning, presumably for bombing raids.



"Flight" photographs.

The flagship "Nelson" and (above) H.M.S. "Revenge" and one of her sister ships just after a concerted attack by Ansons of No. 217 squadron.

The morning sun was still low when the Ansons trickled out on to the dewy aerodrome and took up their formation in preparation for the take-off, to be signalled from the tarmac by a Very light. For this first raid the squadron was being led by a Flight Lieutenant, beside whom we took our place.

The Anson was aptly described to us as "a real Wing Commander's aeroplane." Having the more desirable qualities of a conservatory combined with good aerodynamic form, it has attained great popularity.

Whether it was the comfort of the machine or the reassuring efficiency of the crew, one experienced not the slightest qualms as the coast slipped under our wings and the fifteen Ansons nosed out over the patchy grey sea on a course for the Casquets, those rugged little islands which rise out of the sea like strange mammals west of Alderney. We cruised at a steady 110 knots at about a thousand feet; No. 206 Squadron, which passed us in the distance on our way out, was under orders to fly at a higher speed.

Striking out from the Casquets we droned on for what must have been about three-quarters of an hour until the inelegant outline of the *Courageous* relieved the monotony. After a few minutes a cruiser on our starboard bow turned its searchlight in our direction to stimulate Archie fire, but we were after bigger game. And the Flight Lieutenant was not long in spotting it, signalling the news to the neighbouring machines with the time-honoured "thumbs up."

Our intention was to take advantage of the clouds and to "snake in" low over the convoy by flights, so we played hide-and-seek round the Fleet while the Flight Lieutenant loaded his Very pistol and laid it tenderly on his lap.

It was, to some extent, a matter of luck whether or not we came through the clouds in a favourable position for low-bombing the capital ships. But we did, bursting through the lowest wisps at about 200 m.p.h with *Nelson* and *Rodney* steaming broadside to us; *Ramillies* and the rest were astern. The searchlights glared and *plop!* went our Very pistol.

Close Quarters

One will always remember that first sudden view of those great ships, their shining decks arrayed tidily with strange nautical gear, turrets marked with a broad red, white and blue band just to confirm their nationality, though their identity could hardly be mistaken with the squat "Queen Anne's Mansions" and the apparently inadequate funnel crammed toward the stern, giving pride of place to the fifteen-inch guns. Exhilarated, we set a course for Start Point, skirted the coast and landed by flights to learn that we had time for a snack before joining company with the Vildebeests of No. 42 Squadron for a combined attack with bombs and torpedoes.

This second raid was headed by the Squadron Leader, who led the Ansons to a rendezvous over Thorney Island. As we crossed the aerodrome the Perseus-Vildebeests were just taking off and we made a circuit to allow them to climb to our level and take up their position astern. Then the force of twenty-seven machines swept westward down the Channel.

By this time the convoy was much nearer, although since the last reports of its position had been received it had changed course and was about twenty miles from its estimated position. But the Ansons duly led the big biplanes to the target

The Vildebeests attacked in two waves and we saw the splashes of the torpedoes as our nose went down for a low-bombing attack. We caught the convoy just as it turned to avoid the mouldies, zoomed up, and watched destroyers retrieving the red-nosed projectiles.

We celebrated what we counted a successful raid with a bar of chocolate and went home to tea.

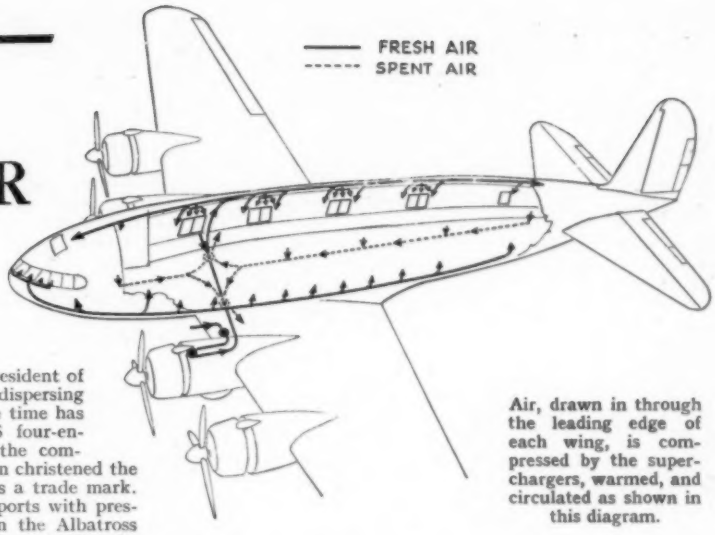
Whatever the "lessons" (if any) of the exercise, it did demonstrate the efficiency of the new General Reconnaissance squadrons. The keenness of the youthful personnel was something to marvel at; after a raid filler caps were off almost before the Ansons had finished taxying.

"Flight" photograph.

Quick fill-up: No. 217 Squadron's Ansons about to be replenished by "Mr. Zwicky" at Tangmere.

AND NOW — the STRATOLINER

Features of the Boeing 307 and 307-S Transports : Operation at 20,000ft.



Air, drawn in through the leading edge of each wing, is compressed by the superchargers, warmed, and circulated as shown in this diagram.

A STATEMENT by Mr. C. L. Egtvedt, president of the Boeing Company, goes far towards dispersing the haze of semi-secrecy which for some time has surrounded the Boeing 307 and 307-S four-engined transports now under construction at the company's Seattle works. The basic design has been christened the Stratoliner, the name having been registered as a trade mark. The new machines will be the first large transports with pressure cabins for high-altitude operation. As in the Albatross the fuselage is of circular cross-section throughout its length. Thirty-three passengers will be accommodated by day and twenty-five by night, and there will be stowage for 2 tons of mail and cargo. Power plants in the standard 307 will be four G102 Wright Cyclones (1,100 h.p. for take-off); these are for operation at moderate altitudes, so presumably similar engines with two-speed blowers will be specified for the 307-S.

The basic reasons for the Stratoliner are that as height increases not only do atmospheric pressure and density decrease, but movement of the air in prevailing winds becomes swifter and more uniform, and the temperature decreases steadily with altitude—normally about 3½ deg. every 1,000ft. The thermometer drops to 65 deg. below zero Fahrenheit at approximately 35,000ft. (in the temperate zone), and thence upward it ceases to get colder. This region of stable temperature, extending as far up as there is still a trace of atmosphere, is the true stratosphere.

The Stratoliner's flight path will, of course, be below the true stratosphere but above the heavy air belt that brews surface weather conditions. This region is in the troposphere, more commonly known as the sub-stratosphere.

It is here that most of the benefits of the stratosphere can be obtained without becoming involved in the complex problems of flight in the extremely rare atmosphere and low temperature of the true stratosphere. At 20,000ft. there is very little difference between summer and winter. No matter what the weather is below, the thermometer always registers something like 10 deg. below zero. Although the winds are not entirely constant at this level, they are considerably more so than at lower altitudes and the air is virtually free from the turbulence that sometimes gives passengers a rough journey at lower levels.

Storm clouds and icing conditions, except on rare occasions, lie below this flight path. When thunderheads do extend into the upper level they are so localised that they may readily be avoided. Normal clouds at this height are so thin that they appear as thin smoke rather than fog when a machine passes through them.

The air is sufficiently rarefied to allow high speeds at normal cruising power. On 2,500 h.p. at 20,000ft., the Stratoliner will cruise at 240 m.p.h.

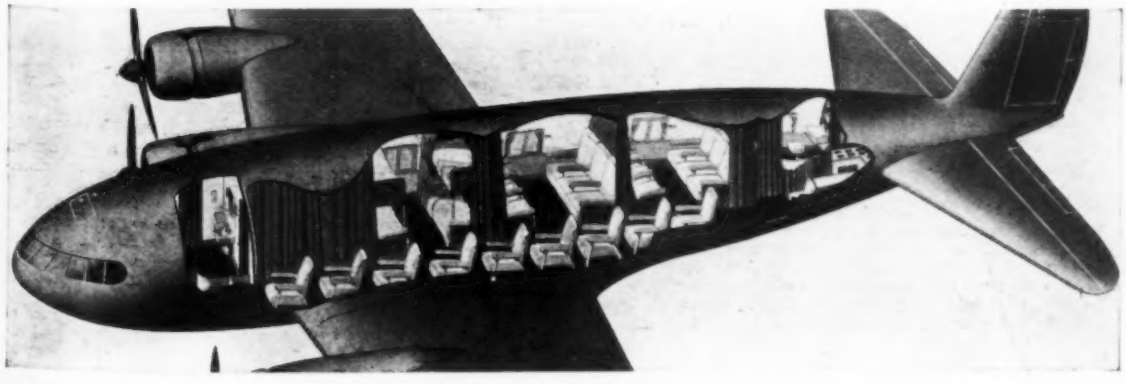
At sea level the atmospheric pressure is 14.7 lb./sq. in.; at heights up to 10,000ft., where the pressure is a third less, most persons are entirely comfortable. Up to 12,000ft. the human system continues to function quite normally, but at 13,000 and 14,000ft., where the atmospheric pressure is down to 8.6 lb./sq. in., most people are definitely aware that they are "up high"; they lose their sea level spryness. Above this point, tests have shown, the low air pressure and resultant shortage of oxygen makes a person mentally drowsy and sluggish in his actions. The effect increases with more altitude.

Compressing and Warming

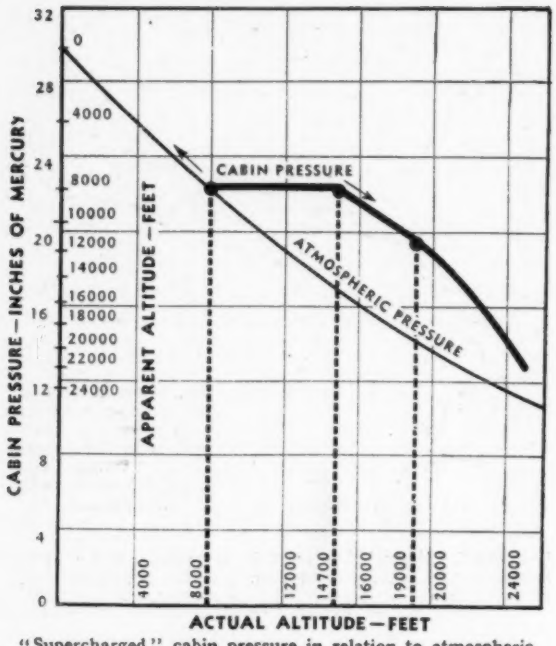
At 18,000ft. the atmospheric pressure is half as great as at sea level, and at 20,000ft. it has decreased further to 6.7 lb./sq. in. But a sample of the air taken at any of these levels shows that the percentage of oxygen and other gases is always the same. When compressed and warmed, the air at high altitudes resumes its low-altitude condition.

As the Stratoliner climbs, its mechanical superchargers and pressure regulating apparatus will come into action to preserve automatically the proper pressure inside the cabin while the outside pressure continues to decrease. The thoroughly sealed cabin, with its heavy pressure-resistant windows, will enhance the plane's normal soundproofing and should give passengers an exceptionally quiet trip.

The automatic pressure-regulating system brings a new



Cabin arrangements of the Boeing Stratoliner, which will accommodate 33 passengers by day or 25 by night. Just aft of the control cabin is the men's dressing room, and then four compartments—the first two shown made up for night travel. On the near side are nine chairs for short-trip passengers. At the rear are the women's dressing room and the galley.



"Supercharged" cabin pressure in relation to atmospheric pressure at various altitudes.

advantage during ascents and descents. By merely arranging the proper setting on pressure regulating controls, the crew can bring the Stratoliner from an altitude of 15,000ft. to sea level at the rate of 565ft./min. without discomfort to passengers, because the cabin pressure changes only at the rate of 300 ft./min. This will mean a substantial time saving.

The cylindrical walls of the Stratoliner's cabin, including windows, doors, and fittings where controls pass through the shell, are constructed to withstand a pressure difference of 6 lb./sq. in between inside and outside air. The machine will be operated, however, at a pressure difference of only 2½ lb./sq. in., which is sufficient to keep the "apparent cabin altitude" at 8,000ft. at a height of 14,700ft., and "at 12,200ft." when 20,000ft. high.

Fresh air, drawn through the leading edge of each wing, is compressed by two engine-driven superchargers and circulated throughout the cabin after being heated by means of freeze-proof condenser-type steam radiators. Either of the two fully independent sets of supercharging and heating apparatus can handle the entire job alone. Spent air is discharged through an exhaust chamber below the floor.

The entire system operates automatically with the same ease as a thermostatically controlled home air conditioning and heating system. Controls for hand regulation are also provided.

An automatically controlled fresh air supply sufficient for 40 persons is furnished by the blowers. The air is conducted directly into the cabin ventilating system, so that individually controlled ventilators at passenger seats supply the same "conditioned air" as do the general circulation vents.

The circular section of the fuselage was chosen because it is the most practical shape for a pressure cylinder and at the same time is advantageous aerodynamically. Semi-monocoque construction is used, with Alclad aluminium alloy skin covering on Z-section rings and longitudinal stiffeners.

The low cantilever wing is of the typical Boeing truss and stressed-skin type. Wing covering consists of smooth Alclad skin over aluminium alloy corrugations. Fittings are of high strength steel. The flaps and undercarriage are electrically operated.

A new semi-monocoque construction making for quick detachability of the engines is used for the nacelles. The four Wright GR-1820-G102 Cyclone engines (in the 307) drive three-bladed Hamilton Standard Hydromatic airscrews, of the constant-speed, full-feathering type.

Fuel tanks with a capacity of 1,275 U.S. gallons are installed in the inner-wing sections. Additional tanks may be fitted to increase the capacity to 1,700 U.S. gallons. There are no fuel pipes within the fuselage.

The Stratoliner has a span of 107ft. 3in.; a length of 74ft. 4in.; and an overall height of 17ft. 3in.

Immediately aft of the cockpit in the nose is the men's dressing room, and behind this is the main passenger cabin, the right side of which is divided into four travel compartments, each containing Davenport-type seats for six passengers. Each compartment makes up into two sets of upper and lower berths at night. Along the left side of the cabin are nine reclining chairs.

Aft of the passenger section is the women's dressing room on the right and the galley at the left. There is a pressure bulkhead just aft of the galley.

Passengers enter the cabin through a side door, the crew having a separate entrance to the cockpit from below. Cargo is loaded into the hold through this lower doorway.

BOEING 307.

Four Wright GR-1820-G102 Cyclone Engines.

Maximum speed on 3,600 h.p.	211 m.p.h. at 6,000ft.
Cruising speed on 2,500 h.p. (69.5% power)	215 m.p.h. at 10,000ft.
Cruising speed on 2,160 h.p. (60% power)	202 m.p.h. at 10,000ft.
Cruising speed on 1,800 h.p. (50% power)	184 m.p.h. at 10,000ft
Take-off distance at sea level at 4,400 h.p.	1,040ft.
Take-off distance to clear 50ft. obstacle	1,900ft.
Take-off distance to clear 50ft. obstacle on any three engines after failure of one engine 1,200ft. from start	2,700ft.
Landing distance to stop over 50ft. obstacle	2,300ft.
Service ceiling with four engines	23,300ft.
Service ceiling with any three engines	18,200ft.
Absolute ceiling with any two engines	10,500ft.
Absolute ceiling with any two engines at 36,000-lb. gross weight	14,200ft.
Initial rate of climb with four engines at 840 h.p. each at sea level	1,250ft./min.
Initial rate of climb with three engines at 840 h.p. each at sea level	700ft./min.
Initial rate of climb with two engines at 840 h.p. each at sea level	200ft./min.
Specific fuel consumption	0.44 lb./h.p./hr.
Range with 7,000-lb. (3,180-kg.) payload at maximum gross weight and with standard equipment, furnishings, de-icers, radio, food, water, bedding and 1,275 gals. fuel:	
Optimum cruising—average speed 150 m.p.h. (242 km.p.h.)	1,950 miles.
Cruising at 50% power or 1,800 h.p.—184 m.p.h. (296 km.p.h.)	1,750 miles.
Cruising at 60% power or 2,160 h.p.—202 m.p.h. (325 km.p.h.)	1,600 miles.
Cruising at 69.5% power or 2,500 h.p.—215 m.p.h. (346 km.p.h.)	1,475 miles.
Range with 9,750-lb. (4,420-kg.) payload at maximum gross weight and with standard equipment, furnishings, de-icers, radio, food, water, bedding and 850 U.S. gals. of fuel:	
Cruising at 184 m.p.h.	1,150 miles.
Cruising at 202 m.p.h.	1,050 miles.
Cruising at 215 m.p.h.	975 miles.

Lord Swinton at Speke Shadow Factory

LORD SWINTON, Secretary of State for Air, devoted a recent Saturday to a visit to the huge new Rootes aircraft shadow factory at Speke, near Liverpool, afterwards returning to London by air.

Lord Swinton was received on arrival by Mr. R. C. Rootes, deputy-chairman of Rootes Securities, Ltd., Sir Alfred McAlpine, of Sir Robert McAlpine and Sons, Ltd., the contractors who have been responsible for the construction of the factory; and Mr. A. A. Rowse, M.I.M.E., M.I.A.E., general manager of the factory, who conducted him round the major part of the plant.

He investigated the factory layout, its equipment and the methods employed in the production of the Bristol Blenheim medium bomber.

The main erecting shop alone is a quarter of a mile long and covers an area of about 14 acres.

Sabotage

THE instances of sabotage which recently occurred in aircraft factories were reviewed in a written reply by Lord Winterton, Chancellor of the Duchy of Lancaster, last week.

"Since the case of malicious damage which occurred at the Ringway aerodrome last month" (the reply states) "there have been further instances at the Stockport factory. The damage, which was discovered between March 19 and 22, was to the electric wires installed in four Battle aircraft. One of these aeroplanes was due for delivery to the Royal Air Force and the other three were for Belgium. A further case of severed wires to an aircraft due for delivery to the Royal Air Force was reported by the Supermarine Aviation Company at Southampton on March 17, and a similar case by the Armstrong Whitworth Company at Baginton, near Coventry, on March 29. Police investigation is actively proceeding in each case.

"All aircraft manufacturers have been made aware of the problem and all practicable precautions are being taken."

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

W.R.A.F.R.?

Women as Instructors?

THE recent short broadcast on the subject of a women's Air Reserve did not seem to be taken very seriously. It does, however, seem a pity that women who have proved themselves to make admirable pilots are not included in some way in the plans for air defence and increase in flying personnel.

The Volunteer Reserve is now, I believe, proving very successful, but the fact remains that a very large percentage of members are unable to fly during week-day mornings and afternoons, when there are a considerable number of machines and instructors available.

Is it not possible for a scheme to be instituted for a Women's R.A.F. Reserve, to train competent women flying instructors? In the case of war there would undoubtedly be a shortage of instructors, and this job, at any rate in the *ab initio* stages, could be efficiently taken over by trained women pilots.

The case might be carried a step farther to supply women pilots for home communications, airlines, etc., in time of war.

I do not remember hearing any criticism for or against women instructors, and should be pleased to know if there are any outstanding drawbacks to a scheme of the type outlined above.

PILOTESS.

London, N.W.1.

COURTESY AND CROYDON

Plaint of a Private Air Visitor

HAVING recently landed at Croydon Airport on two occasions, I am struck by the absence of courtesy shown to the visitor there.

Although I am quite capable of swinging the propeller myself, I refuse to do so when I have paid a fee to land, and especially at a place like Croydon, where one would expect to find someone ready, willing and able to give one any service required in getting away again for no further charge.

At all less important country aerodromes one does not even have to ask for a swing; it is always offered.

Leamington Spa. JOAN PARSONS.

FRONTOLOGISTICS

Those Navigation Examinations

I AM writing to plead "not guilty" to the assertions contained in Mr. Sims-White's letter (*Flight*, March 10) with regard to my article on the changes in the Second-Class Navigators' syllabus. Mr. Sims-White has, consciously or unconsciously, distorted phrases used in the article in an abortive attempt at criticism. To quote an example: I did not say that certain new items in the syllabus "constitute astronomical navigation." My words were: "It will not need very many additions to this section to bring in the whole of astronomical air navigation," and I am sure that any unbiased reader who understands the subject will agree with my statement.

I note that Mr. Sims-White's opinion is that the syllabus has not yet reached a generally satisfactory degree of perfection. I heartily agree with him, but at the same time I have a feeling that Mr. Sims-White's idea of perfection is not mine. I infer from Mr. Sims-White's remarks that the syllabus will only attain perfection when every obscure theoretical problem has been included. On the other hand, I stoutly maintain (and I know that I am far from being alone in my attitude) that many portions of the syllabus have little practical value, and I am prepared, if necessary, to quote examples in support of my statement. I can find nothing in my article to indicate that (again to quote Mr. Sims-White) "finding the hour angle of the sun, planets and stars is a task reserved for treatment by a mathematical genius." Mr. Sims-White's contention that this is a simple arithmetical problem is one with which I agree, but this does not, and cannot, dispose of my argument that this portion of the syllabus as it stands is of little practical use. I challenge Mr. Sims-White to tell your readers of what use it is for a navigator to be able to recognise a certain star (with the sole exception of the Pole Star) if he cannot calculate the hour angle of the star (which at the moment is not required by the syllabus).

In regard to meteorology, the fact that the general question of "fronts" is now a routine item does not render the insertion of fronts on a synoptic chart an easy one. I did not invent the terms "frontology" and "frontologists," and if Mr. Sims-White is not familiar with these items (now in common use in the Meteorological Office), I can only assume that he is not quite *au fait* with modern meteorological developments. The idea of fronts may be, as Mr. Sims-White declares, an "elementary consideration," but that hardly agrees with the fact that the Meteorological Office employs expert frontologists whose sole work is to insert (or to supervise the insertion of) the fronts on synoptic charts.

I wonder whether Mr. Sims-White will deny my assertion that a comparison of English, French, German and Norwegian synoptic charts for the same hour and region will often reveal that the fronts have been inserted by the meteorologists of the different nations in different places.

I take the opportunity of reiterating my firm opinion that the Second Class Navigators' syllabus could be made much more practical without in any way lowering its standard, and that it is a sheer waste of time for candidates for this examination to have to carry in their heads a mass of useless theory (which is cheerfully forgotten immediately after the examination) at the expense of practical knowledge.

I have no desire to exaggerate the difficulties of would-be navigators, but Mr. Sims-White's assurance to prospective candidates of the "childish simplicity" of all these problems can only be compared to the dentist's cheerful assurance that "this is not going to hurt you." C. W. MARTIN,

London, W.11. Imperial School of Air Navigation.

"Flight" photograph

STRANGE CARGO: Two flamingoes, part of the odd zoological consignment unloaded from International Air Freight's Curtiss Condors at Croydon last week, as related by "A. Viator" on page 350.

IMPERIALS AND THE CADMAN REPORT

A Reader Crosses Swords with C. W. A. Scott

I WONDER how many critics of Imperial Airways and the Air Ministry have taken the trouble to read that historic document, the Cadman Report.

Take, for instance, the terms of the Opposition's amendment during the recent debate on the Report in the House of Commons: "In view of the disclosure of long-standing ministerial neglect and of gross inefficiency in the management of a heavily subsidised company . . ." etc.

As a matter of fact, the Cadman Report not only acquits the company of every charge of inefficiency in respect of the running of their services, but takes some trouble to prove that Imperials are by far the most efficient of the big national airlines. As you point out in your issue of March 17, the only censure on the company is for being too efficient and taking too narrow a commercial outlook.

First, to get the facts in proper proportion, it must not be

CORRESPONDENCE (CONTINUED)

forgotten that the charges of inefficiency related only to the European services of the company, about one-tenth of their total route mileage.

The Cadman Committee deals with these charges as follows:

(Para. 113.) "No passengers and no other staff (except three killed at Elsdorf) have, in fact, been killed on the European services of the company during the years 1935-1937, a fact which, we think, merits emphasis."

(Para. 115.) "We find no evidence to support the suggestion that Imperial Airways' services are less safe than those of any foreign company."

(Para. 116.) "We see no reason for dissatisfaction with the proportion of traffic carried by Imperial Airways."

(Para. 117.) "A comparison on a ton-mileage basis of the subsidies paid to various companies in Europe is given in Appendix K. The figures in this Appendix show that a lower amount was paid to Imperial Airways for work done than to any of the other companies. Since 1934 subsidies to Imperial Airways, expressed as a percentage of the company's total revenue, have been reduced, in the case of European services, from 32.4 per cent. to 20.2 per cent., and for all services from 45.4 per cent. to 23.8 per cent. As will be seen from Appendix L, none of the four large foreign companies can approach these figures."

(Para. 118.) "It is incorrect to state that the dividend of 9 per cent., in respect of the year ended March 31, 1937, was paid out of an increased subsidy. There was, in fact, a reduction in subsidy for that year. During the last three years dividends have increased, while the subsidies have decreased, a result indicative of improved trading."

With regard to para. 116, it is remarkable, in view of the fact that the British Airways' service to Paris is so much faster than that of Imperial Airways, that the latter company should still retain four-fifths of the total passenger traffic, and goes to prove how right Imperials have been in their policy of providing really comfortable and roomy 'planes, first-class catering, etc.

In para. 117, the Committee makes amends for a statement in para. 46, where it refers to Imperials as being heavily subsidised. A heavy subsidy means that the payment made is high in proportion to the services rendered, whereas the present subsidy is very low expressed in shillings per ton-mile, and will be halved this year.

The above extracts from the report are, I think, more than sufficient reply to the comments of Mr. C. W. A. Scott, published in a recent issue of *Flight*.

It was the Government who first called Imperial Airways their "chosen instrument" (see Empire Air Mail Scheme, Cmd. 5414, para. xv). Mr. Scott forgets to mention that the Qantas D.H.86's are faster than the Atalantas and Hannibals because they are much newer machines and carry a lighter load.

Why should Mr. Scott consider that shareholders are likely to be opposed to reasonable development? Does he think that the payment of dividends is a sign of easy inactivity? If dividends had not been forthcoming in the past, to whom would Imperials look for the additional four million pounds of capital they now require?

The Cadman Committee report resembles Jellicoe's first dispatch after Jutland, which appeared to turn a British victory into a defeat.

W. L. NAYLOR.

London, W.9.

THE POOR PRIVATE OWNER

Subsidise the Pilot Instead of the Club?

IT has been my intention for a long time to write a "moan" on behalf of the P.P.O., but I have been forestalled by both the Duke of Richmond and Gordon and "Indicator" in the same week [*Flight*, March 31].

I heartily agree that the P.P.O. should be subsidised. I would go further and state that the subsidy given to clubs is entirely wrongly administered. My suggestion is that the subsidy should be given directly to those obtaining and renewing their "A" licences. Human nature is such that they hate the idea of somebody else getting the bonus in addition to the payment they make for their flying. I venture to suggest that if the subsidy were given direct to the pilots the number of people taking their "A" licences with a view to getting the reward of £25, with the little blue book containing their photograph, would be more than quadrupled. The clubs would be the last to complain about this "slight" alteration, as the number of their flying hours would soar.

If the P.P.O. could also receive the subsidy, even though it was only a very poor imitation of that given in France, his numbers would go up tenfold.

Just think of the additional numbers of potential pilots who would be available for the defence of our shores. It would save the Air Ministry large sums in advertisement, and still larger sums in *ab initio* training.

Nearly every "A" licence pilot envies the P.P.O. in his freedom, but I know from four years' experience that it costs the P.P.O. about four times as much as flying from a club.

With the subsidy to pilots and P.P.O.s, poor Kronfeld would never have suffered from lack of orders for his famous Drones; instead, his chief worry would be great competition, and the new industry would receive a tremendous fillip.

May I also save headlines and reply to "P.T. 'B' Pilot" and thank him for his recommendation? I find that most "B" licence pilots are frightfully ignorant on the question of ultra-light flying and condemn it because it is easy, safe and cheap, which makes their skill superfluous.

Here is a holder of a "B" licence with considerable experience who finds entirely new pleasures while playing with my toys!

H. R. DIMOCK,
Ely Aero Club.

Ely, Cambs.

OLEAULIC?

No Water in Aircraft Plumbing, so . . .

TO continue to use the word "hydraulic" in speaking of the systems used in the power operation of moving parts and controls of aircraft seems to be incongruous when the fluid used is *not* water; but the meaning of the word is so well established that any new term which may be coined should preferably convey the same ideas. I suggest that oleo-aulic might legitimately be reduced to "oleaulic" (four syllables, of course), and that this may meet the case.

R. J. HARRINGTON HUDSON.

S. Devon.

BROADSIDE FIRE

The Cazaux Effect—and Another

AS Mr. North is still, apparently, interested in the details of the Cazaux experiments, I offer the following information for what it is worth. The aircraft were *multiplace de combat twin-engined* monoplanes capable of nearly 200 m.p.h.; the guns, so far as I know, were rifle-calibre Darnes; and the mountings were in manually operated turrets. I shall be interested to learn what kind of deductions Mr. North intended to make had I been able to supply detailed answers.

Perhaps Mr. North can tell us something of a new effect noticed, I believe, at heights over 15-17,000ft., due to the change of sound velocity at altitude. Apparently, the Cazaux effect is less noticeable at such heights.

TACTICIAN.

London, W.1.

SPEED OF THE WIND

—and of One Hurricane in Particular

I WAS interested to see a paragraph in a recent issue in which it was said that the top speed of the Hawker Hurricane multi-gun fighter as supplied to the R.A.F. may be taken to be 330 m.p.h.—according to the S.B.A.C.'s figures! Perhaps this figure refers to the sea-level speed? [No; sea-level speed would be very considerably lower.—ED.] Bearing in mind the flight of one of the Hurricanes of No. 111 (F.) Squadron from Edinburgh to Northolt at an average speed of 408.75 m.p.h., the first thing that strikes one is that there must have been a following wind of 80 m.p.h. On second thoughts we decide it must have been considerably more, because of:—

(1) The comparatively low speeds of the take-off and touch-down.

(2) The initial climb to 17,000ft.

(3) The fact that the wind was not blowing dead under the machine's tail all the time, but diagonally behind it (as mentioned in *Flight*).

(4) The Air Ministry statement that the machine was not going "flat out" at any time during the run!

So we conclude that either Nature's "hurricane" must have beaten all the world's records since Creation, or else (rather a big or) Hawker's Hurricane must have exceeded the S.B.A.C.'s figures by a pretty colossal margin.

Also (welcome thought) we have the Supermarine Aviation Co. (Vickers), Ltd., advertising the Supermarine Spitfire in *Flight* as "the fastest military aeroplane in the world"!

M. J. WEST.

Market Harborough.

OVER THE CHANNEL : Vildebeests of No. 42 (T.B.) Squadron on the way to torpedo a "convoy" in the Channel (as related on pages 342a-342d) seen from the gunner's cockpit of a consort.

Royal Air Force and Fleet Air Arm News : Official Announcements: Military Aviation Abroad

SERVICE AVIATION

Nairobi

A STATION headquarters formed at Nairobi with effect from March 1, on which date No. 223 (Bomber) Squadron was expanded to a headquarters and three flights.

An expansion of the number of squadrons in overseas Commands is to be expected, and the above-mentioned step would facilitate an increase in the Kenya garrison.

A New Bombing Range

A HIGH-ALTITUDE practice bombing range is being constructed at Misson (Yorks) and may be brought into general use at all times with effect from May 1. The range will be administered by the C.O., R.A.F. Station, Hemswell.

Central Flying School

THE undermentioned officers and airmen have been recategorised:—

A.2 to A.1.—Flt. Lts. F. W. C. Shute and C. S. Moore, P/O.s L. Gregory and C. Scragg, F./Sgts. W. C. Maher, A. Strugnell, A. W. Hall, E. B. G. Masefield, T. M. Scott.

B. to A.1.—Flt. Lt. J. W. B. Judge.

B. to A.2.—Flt. Lts. E. A. Douglas-Jones, D. W. Reid, E. P. P. Gibbs, F./Sergt. J. D. W. Willis.

£11,000,000 for New Stations

A FURTHER section of the biggest building programme that any Government department has been called upon to carry out is now being launched by the Works Directorate of the Air Ministry. It is the next step in the further progressive expansion of the Royal Air Force which has been lately approved by H.M. Government. The works programme provides for the construction of additional Air Force stations and maintenance units distributed throughout England and Scotland at a total cost in the coming financial year of nearly £11,000,000.

Many thousands of building operatives will be employed on the work for the greater part of two years. Already the Works Directorate is urgently seeking quantity surveyors, assistants to surveyors and clerks of works in large numbers. Upon the speed with which labour and staff come forward will depend the speed at which the expansion of the Air Force can be completed. In the near future civil engineers and engineering assistants will also be needed. The amounts to be spent on individual works under the programme vary from £250,000 to £1,000,000.

The new Air Force stations will contain, in addition to the aerodromes, brick and reinforced concrete buildings for the accommodation of officers and men and for the housing of aircraft, the usual recreational and other ancillary establishments.

The magnitude of the works programme now in hand is shown by the growth of the Works Directorate Vote. In the last five years it has risen from £1,762,000 to £16,322,000.

Flying Training Schools

THE undermentioned officers and airmen have been awarded special assessments on finishing their training at Flying Training Schools:—

No. 5 F.T.S., Sealand

Special Distinction.—A.P/O. T. R. T. Carr-Ellison, Sergt. Lamb, T. R.

Distinguished Pass.—A.P/O.s S. D. P. Connors, J. F. Mackie, G. B. Walford, R. J. Walker, Sergt. Hughes, G. H. K.

No. 7 F.T.S., Peterborough

Special Distinction.—A.P/O. P. B. Sentance.

Distinguished Pass.—A.P/O.s I. G. Richmond and G. Vivian.

No. 9 F.T.S., Hullavington

Distinguished Pass.—A.P/O. A. E. Brian, and Sergt. Winter, D. C.

Flying Accidents

THE Air Ministry regrets to announce the following accidents:—A collision in the air occurred at Scampton on March 31, between two aircraft of No. 49 (Bomber) Squadron, Scampton, Lincolnshire, in which P/O. John Nugent de Merle Tyrrell, Sergt. Benjamin Gordon Davies and A/C.2 James Henry Scoberg, lost their lives.

Sergt. William Alexander Sutherland and Cpl. Robert Hunter lost their lives in an accident which occurred at Howood, Renfrewshire, on April 1, to an aircraft of No. 269 (G.R.) Squadron, Abbotsinch.

Royal Air Force Gazette

General Duties Branch

Flt. Lt. E. M. Donaldson granted permanent commission in rank, March 29, 1938. Flying Officers promoted to rank of Flight Lieutenant on dates stated: P. E. Meagher, March 6, 1938; J. W. McGuire, March 14, 1938.

Wing Cdr. W. A. Coryton, M.V.O., D.F.C., granted acting rank of Group Captain (unpaid) whilst employed at Air Ministry, March 7, 1938. Flying Officers granted acting rank of Flight Lieutenant on dates stated: P. H. Dutton (since promoted), G. E. Jackson (since promoted), J. E. Kirk (since promoted), June 8, 1937; P. H. R. Saunders (since promoted), June 10, 1937; R. L. Vivian, September 2, 1937; R. J. Burrough, October 12, 1937; E. K. Piercy, October 28, 1937; R. C. F. Lister (since promoted), November 10, 1937; D. M. Newman, December 22, 1937; C. D. Hackett, January 27, 1938.

F/O. J. R. Gillman (since promoted) granted acting rank of Flight Lieutenant for periods stated: June 8, 1937, to July 5, 1937, inclusive; October 11, 1937, to December 23, 1937, inclusive. Flt. Lt. P. B. Coote seconded for duty with British Military Mission, Egypt; February 15, 1938 (substituted for notification in *Gazette* of February 22, 1938). Wing Cdr. E. B. Beauman placed on retired list at own request, March 21, 1938. Wing Cdr. A. T. Whitelock placed on retired list, March 25, 1938. Flt. Lt. A. F. Hamilton transferred to Reserve, Class A, March 15, 1938. Flt. Lt. T. C. Chambers transferred to Reserve, Class A, March 16, 1938.

Medical Branch

Flt. Lt. J. McGovern, M.B., B.Ch., transferred to Reserve, Class D, March 27, 1938.

SERVICE AVIATION (CONTINUED)

Royal Air Force Reserve

Reserve of Air Force Officers
General Duties Branch

Maj. C. M. Crowe, M.C., D.F.C., granted commission as Flight Lieutenant (Hon. Sqn. Ldr.) in Class C, November 20, 1937. Flt. Lt. H. G. Hamilton transferred from Class A to Class C, March 31, 1937. Flt. Lt. R. Duncanson relinquishes commission on completion of service and permitted to retain rank, August 31, 1937.

Auxiliary Air Force

Medical Branch

502 (ULSTER) (B.) SQUADRON.— F/O. C. W. Kidd, M.D., B.Ch., promoted to rank of Flt. Lt.; January 23, 1938.

503 (COUNTY OF LINCOLN) (B.) SQUADRON.—F/O. A. C. Fraser, M.R.C.S., L.R.C.P., promoted to rank of Flt. Lt.; February 12, 1938.

Royal Air Force Appointments

General Duties Branch

Air Commodore.—S. W. Smith, O.B.E., to H.Q., Bomber Command, Uxbridge; for duty as Senior Air Staff Officer, 7.3.38.

Group Captains.—P. Huskinson, M.C., to Special Duty List; for duty as R.A.F. Member of Ordnance Committee, Royal Arsenal, Woolwich, 14.3.38. A. W. Milne, to R.A.F. Station, Leconfield; to command, 14.3.38. J. C. Russell, D.S.O., to R.A.F. Station, Thorney Island; to command, 23.3.38.

Wing Commanders.—(Act. Group Capt.) W. E. Bryant, M.B.E., to Special Duty List; on appointment as Air Attaché, Tokyo, 9.2.38. W. A. B. Bowen-Buscarlet, D.F.C., to R.A.F. Station, Scampton; to command, 22.3.38. H. V. Drew, O.B.E., A.F.C., to R.A.F. Station, Cottesmore; to command, 11.3.38.

Squadron Leaders.—G. S. Hodson, A.F.C., to Special Duty List; on interchange duty with Royal New Zealand Air Force, 24.2.38. A. D. Davies, to Deputy Directorate of Organisation, Air Ministry, 14.3.38. N. W. A. Cullum, to School of Naval Co-operation, Ford; for Administrative duties, 27.1.38. W. N. Blain, to No. 216 (B.T.) Squadron, Heliopolis, Egypt; for flying duties, 21.2.38. J. E. W. Bowles, to No. 115 (B.) Squadron, Marham; for flying duties, 9.3.38. T. G. Pike, to No. 10 F.T.S., Tern Hill; for duty as Chief Flying Instructor, 15.3.38. D. J. Waghorn, to H.Q., No. 4 (B.) Group, Linton-upon-Ouse; for Navigation duties, 14.3.38. T. W. G. Eady, to No. 201 (G.R.) Squadron, Calshot; for flying duties, 23.2.38.

Flight Lieutenants.—D. J. Eayrs, to No. 2 F.T.S., Tern Hill, 21.3.38. G. T. Jarman, to No. 2 F.T.S., Brize Norton, 21.3.38. D. P. Lee, to No. 1 Balloon Training Unit, Cardington, 18.3.38. A. C. Watson, to No. 26 (A.C.) Squadron, Catterick, 2.3.38. J. Y. Humphreys, to Electrical and Wireless School, Cranwell, 21.3.38. R. Sorel-Cameron, to H.Q., Training Command, Market Drayton, 28.2.38. T. F. U. Lang, to No. 610 (County of Chester) (B.) Squadron, Hooton Park, 8.3.38. N. C. Hendrikz, to R.A.F. Station, Kalafrana, Malta, 2.2.38. G. L. Menzies, to No. 114 (B.) Squadron, Wyton, 8.3.38.

Equipment Branch

Squadron Leaders.—H. Seidenburg, to R.A.F. Station, Seletar, Singapore; for Equipment duties, 5.2.38. J. Davidson, to Special Duty List; on interchange duty with Royal New Zealand Air Force, 24.2.38.

Flight Lieutenant.—E. G. M. Charleson, to Aeroplane and Armament Experimental Establishment, Martlesham Heath, 17.3.38.

Accountant Branch

Flight Lieutenant.—S. W. Hill, to R.A.F. Station, Cottesmore, 11.3.38.

Medical Branch

Squadron Leader.—J. Hutchieson, to Directorate of Medical Services, Air Ministry; for Staff Duties, 15.3.38.

Flight Lieutenant.—A. W. Smith, to Central Medical Establishment, London, 15.3.38.

Owing to the greatly increased length of these lists as a result of R.A.F. expansion, ranks are confined to those of Flight Lieutenant and above.

FOREIGN SERVICE NEWS

French Higher Command

GENERAL VUILLEMIN has been promoted to the position of Chief of the General Staff of l'Armée de l'Air. This is the highest post in the Service and carries with it the command of all military aviation in France and her colonies.

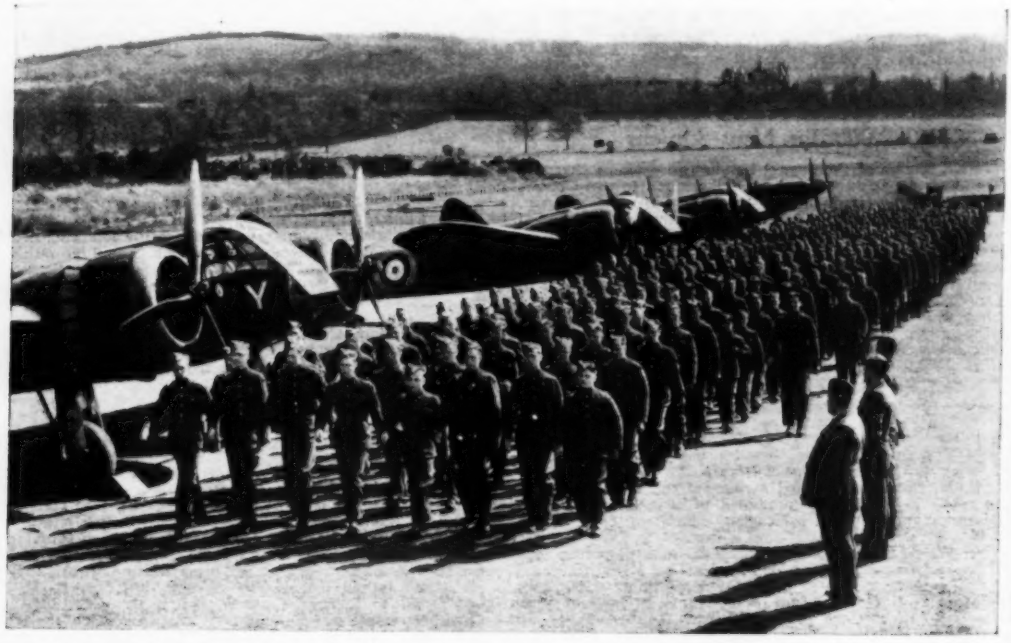
A 250,000 lb. Bomber!

MR. GLENN L. MARTIN, whose current twin-engined types went far toward setting the pace for medium bombers, claims that he is now in a position to build a bomber of 250,000 lb. all-up weight which would carry 4,000 lb. of bombs for 11,000 miles at 380 m.p.h.

Aerial Minelayers

THE following is quoted from our American contemporary *U.S. Air Services*. It is the testimony of Lester P. Barlow before the House Naval Affairs Committee:—

"He told that committee that for the price of one battleship the Navy could have 1,200 bombers. That there were construction designs now available for aerial mines—mines, not bombs—that would explode under water and do the damage of a marine mine. And he said that these 1,200 bombers, each carrying two such mines, could 'blanket an area of 10 square miles, in three to five minutes, from a height beyond the range of anti-aircraft guns."



"IT WAS A FAMOUS VICTORY." The Battle and the Blenheim make an appropriate background for the aircraft apprentices of Halton. The officers' mess is in the distance.

DORNIER RECORD

England to South America Non-Stop : Diesel Engines

GERMAN aviation scored another triumph when, towards the end of last month, a Dornier Do. 18 flying boat fitted with two Junkers Jumo 205 diesel engines flew non-stop from Start Bay, Devon, to Caravellas on the coast of Brazil—5,220 miles in 43 hours. Plans and preparations for the flight had been made very quietly during the previous weeks, and in Germany the general public knew nothing of the attempt until the world's distance record for seaplanes had been successfully beaten by a handsome margin.

The only share in the achievement Great Britain can claim is that we "lent them the start," if a pun may be permitted. The base ship *Westfalen* carried the machine and crew to Start Bay, Devon, where the Do. 18 was catapulted off at 15.05, Central European Time, on Sunday, March 27. The crew of four were Capt Hans Werner von Engel, a D.L.H. pilot "lent" to the Dornier company for the flight, Herr Erich Gundermann, test pilot to the Dornier company, Herr Helmut Rösel, engineer and wireless operator, and Herr Hans Joachim Stein, radio operator, who had made many previous flights across the Atlantic in Dornier flying boats and Hamburger Ha. 139s.

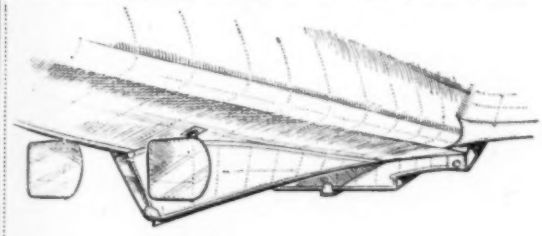
During the earlier stages of the flight head winds were encountered, and it was not until the machine was south-west of the Spanish coast during the night of March 28 that it picked up the north-east trade winds which helped it along until the vicinity of the Equator was reached.

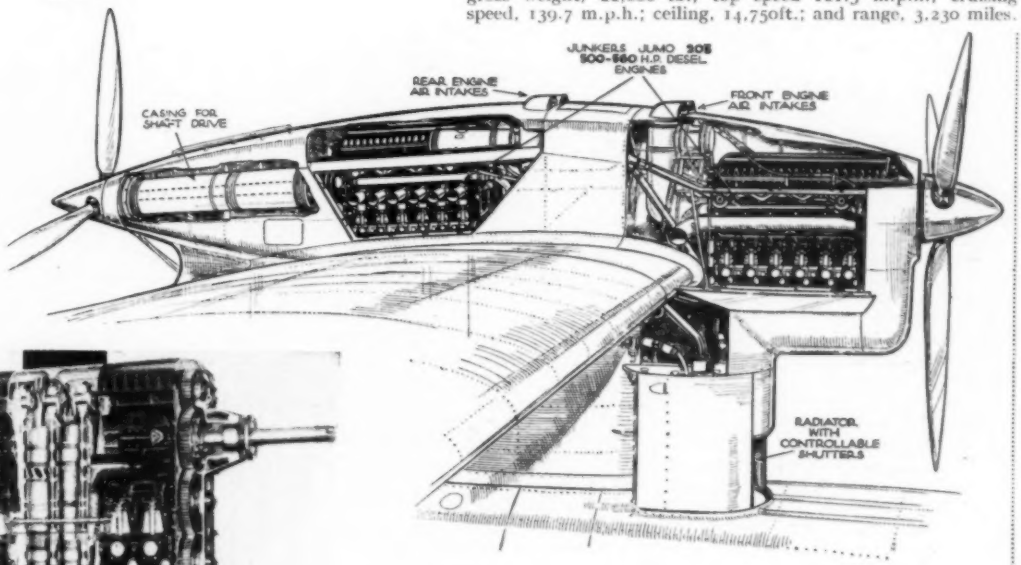
After crossing the line the Do. 18 had varying winds, sometimes against it and sometimes on the side. Las Palmas was reached at 3.30 (C.U.T.) on March 28, and the Cape Verde Islands at 11.15. The island of Fernando Noronha, off the coast of South America, was reached at 22.50 (10.50 p.m.). The Do. 18 flew over Pernambuco at 2.05 on March 29, and Bahia was passed at 5 a.m. At 10.05 a.m. the machine landed at Caravellas. The distance covered was approximately 8,400 km. (5,220 miles), so that the previous record, established by the Italian pilot Stoppani, from Cadiz to Caravellas, had been beaten by nearly 860 miles.

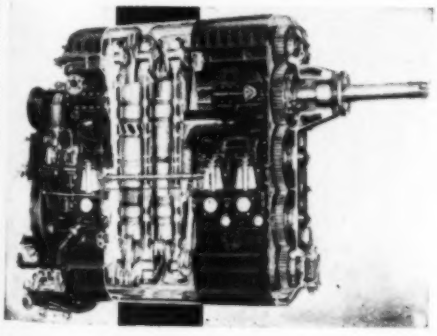
The crew : Second pilot Gundermann ; First pilot von Engel ; Stein (radio operator) and Rösel (engineer).

Except for the fitting of extra fuel tanks, the machine used was a standard Dornier Do. 18 flying boat, with two 600 h.p. Junkers 205 diesel engines placed in tandem above the monoplane wing. We are informed by the Junkers works that on this flight the Jumo 205 diesels established another record by the astonishingly low fuel consumption of 155 grammes (0.341 lb.) per h.p. per hour.

Data for the standard Do. 18 are : Weight empty 12,265 lb.; gross weight, 22,000 lb.; top speed 161.5 m.p.h.; cruising speed, 139.7 m.p.h.; ceiling, 14,750ft.; and range, 3,230 miles.







This special *Flight* drawing shows details of the installation of the Jumo diesel engines ; the internal layout of this type of engine is apparent in the photograph. In the small sketch are seen the peculiar longitudinal steps on each side of the main hull, in addition to the twin water rudders.

COMMERCIAL AVIATION

THE WEEK AT CROYDON

Commercial Aviation at the Airport of London and Elsewhere, as Seen by "A. Viator"

ONE of this spring's services which is worth watching when it arrives at Croydon is the 09.45 "in," which gets its passengers to town by 10.30 or thereabouts.

It is just an aerial "City man's train," and Amsterdam and Rotterdam are the suburbs in this case, for you never see anyone on that machine, morning after morning, except 14 or 20 obvious business men making a day trip to London. They mostly return to their homes by the 18.45 England-Holland connection.

One of last week's interesting passengers was six-year-old Master Terrence Owen Mathews, who left by Imperial Airways for Port Bell, Uganda, quite unaccompanied. The trip is one of 4,600 miles, and Terrence will be met at the other end by his father. After that sort of journey Terrence will probably take a pretty strong line in the family circle when travellers' yarns are being swapped.

Another schoolboy traveller on his own was 11-year-old Peter Packer from London to Athens.

Some excitement was caused recently, when International Air Freight brought in a couple of machines full of a regular air-travelling zoo. Among the many creatures were mongooses, flamingoes, cranes, phalangers (or flying squirrels), oppossum, monkeys, an armadillo (a-dilloing according to tradition), and a toucan, which did *not* remark on arrival: "My goodness, my Guinness."

There were assorted birds in cages and tropical fish in tanks.

Imperials and K.L.M. often carry special tanks fitted with a sort of bicycle-pump attachment for aerating the water during the journey. The tanks contain sea horses. A suggestion that these creatures should be carried in soda-water syphons, to save labour on the air trip, was turned down with unexpected contumely.

Quite a big special charter was arranged by Imperial Airways last week. High officials of the Ford Motor Company left here by Imperial D.H. 86 *Dryad* flown by Capt. Digby, and an Olley Air Service Rapide was subchartered for the job. The flight is *via* such places as Rome, Naples, Rhodes, Alexandria, Cairo, Stamboul and Salonica, and back *via* Bucharest and Budapest.

Highbrow Information

I have just been reading a brochure issued to the public by a leading American air company. It discusses quite a number of matters which we in Europe are inclined, rightly or wrongly, to regard as internal affairs and not for travellers.

High-altitude flying and the fact that it is checked by the flight analyser barograph, flight planning and dispatch, weather reporting, cancellation of flights, reserve motor power, anti-static devices, de-icing, maintenance and overhaul are all simply explained, and even such matters as the use of Link Trainers, the flying laboratory, the salaries of pilots, and the organisation for supervising pilots' health are fairly fully gone into.

I believe these things interest the intelligent air traveller, and give him, or her, confidence in the company, and I know that an American traveller who has read this booklet would seem like a wizard airline executive to an ordinary European traveller.

All the same, I see nothing novel in the booklet, and nothing at all that the average up-to-date, properly equipped European air line is not doing also.

Take pilots' health service, for example. The Dutch company has its own resident medical officer, with consulting rooms and the rest at Schiphol. Not only is the health of pilots and crews attended to, but that of the whole personnel of the firm. Whatever may be termed medico-aeronautical science, from oxygen in trans-Alpine planes to tropical diseases and their prevention on the Far Eastern route, comes under the medical officer, and a special branch of his work is the very complete organisation for the conveyance of invalids by air.

One excellent point in the American booklet is the provision of weather data for passengers. They don't understand it, of course, but it makes them feel important, gives an extra kick to their normal topic of conversation, and does them no harm. What man does not love to pose as a weather wizard?

Actually, the service is designed to combat that "from the office window," forecasting which people are liable to do for themselves. A grey sky, and perhaps a grimy window-pane, has been responsible for many a cancellation when flying conditions were perfect all along the line.

That vexed question of tarmac parking has been pleasantly settled, with a certain amount of give and take all round, by various British and foreign firms, thus saving the risk of a bigger Noah's Ark rearmament race. Noah's Ark, by the way, is the unofficial name for the very dignified covered gangway used by one company for embarking passengers.

It seems to have an uncanny attraction for other people's passengers, who know darn well they ought not to dive into its depths. Not long ago, a couple of such

"Flight" photograph

ROYAL EQUIPMENT: Inside King Ghazi's Percival Q.6, a flying picture of which appears on page 335. On the right is the very complete Marconi two-way radio equipment with D.F (or homing) loop, the graduated control wheel of which can be seen at the top of the picture. Interesting features of the Q.6 dashboard are the trimming cranks on the throttle bank, the D.H. constant-speed airscrew controls at the top of the dash to the right of the throttles, and the vacuum-operated flap control below the airscrew levers. All the six seats have Irvin seat-type parachutes.

COMMERCIAL AVIATION (CONTINUED)

bolted into it, repented half-way down the tunnel, and tried to back out, but their retreat was cut off by a portentous and ponderous passenger propelled from the back by twenty or thirty other travellers. The burning question of the moment was whether one company had stolen and swallowed up two passengers, or if, on the other hand, these passengers had been perfidiously and wantonly allowed to trespass on hallowed ground. I learn, on moderately unreliable authority, that a cæsarean operation had to be performed, amidships of Noah's Ark, to get these errant passengers out.

There were two Vickers Wellesleys at the Airport of Croydon one morning last week. It seemed a bit primitive and a waste of man-power to see a couple of men sitting on the tails of these machines during engine running up. The blokes looked pretty shaken and cold, so perhaps it is some form of hardening process for the human system.

This is the time of year for R.A.F. schemes and exercises all over the air routes, and a certain number of private owners come out of their chrysalis. Army co-op. also begins, to such an extent that the airport control authorities say they cannot warn commercial pilots of machines in their vicinity, and you get searchlight-dazzled people all over the skies.

I offer no comment on the revival of the old, old question of abandoning the safety circuit before landing, but I do wonder whether this is exactly the wisest time to raise the question.

A. Viator.

Luton Opening

July 16 is the date fixed for the official opening of Luton's municipal aerodrome, which will be carried out by the Secretary of State for Air.

Needless to say, flying is already in progress at Luton by the Percival Aircraft Company, and as soon as the aerodrome is licensed and opened for public use—which should be within the next week—the Luton Flying Club, details of which were given in *Flight* of March 24, should also be in action.

South Pacific

According to a *Times*' report, it would seem that the first of the new Boeing boats will be flying next month. This is to be put on the New Zealand service. Incidentally, P.A.A. expect to use Rose Island and not Pago Pago (Samoa), as an interim stop. The two points are about 150 miles apart.

The Tasman Service

The Australian Government has, as might have been expected, nominated Qantas Empire Airways to represent their interests in the proposed Tasman Sea operating company. New Zealand will undoubtedly be represented by Union Airways and this country, of course, by Imperial Airways.

New Equipment for S.A.B.E.N.A.

In the not very distant future the Belgian company, S.A.B.E.N.A., hope to establish a feeder line in the Congo to serve the north-eastern part of the colony. From Stanleyville the line will cross the Kivu, via Irumu and Costermansville, to Usumbura. In addition, they will, in conjunction with South African Airways, operate a service from Leopoldville to Johannesburg, following the western coast line, and a complete scheme will include a service crossing the Congo, via Luluabourg, Kabalo and Albertville, which is the junction for the Eastern Services.

The three-motor Fokkers which are at present in service will be replaced by Junkers Ju.52s, and on the European routes the company already has three Savoia-Marchetti S.83s in service. This machine was of the type which won the Damascus air race and, with three Cyclone G 2 engines, carries ten passengers at a cruising speed of 225 m.p.h.

On the trunk route from Brussels to Elisabethville, which is operated on alternate weeks with Régie Air Afrique, Marchetti-Sabca machines have been used since October, 1936, but these are shortly to be replaced by S.83s, which will reduce the flying time for the whole journey to a matter of twenty-four hours. For the time being there will be no alteration in the schedule and the extra speed will merely give the passengers more time on the ground at the night stops. However, it is expected that the present four-day schedule will, in due course, be considerably shortened.

Aged Fourteen

Last Friday, Imperial Airways gave a little party to celebrate their fourteenth birthday. The guest of the evening was Mr. S. A. Dismore, the assistant general manager, who had returned two days previously from a "discussion" tour by air over the Australia route.

It appears that everything is now set for the flat-rate scheme to Sydney, though the flying-boat bases are not quite ready yet for the through service with three boatloads every week in each direction. It will be remembered that the plans involved the ownership by Qantas Empire Airways of a certain proportion of the fleet, this proportion being flown right through to Southampton and back again, while Indian Trans-Continental Airways will also own part of the fleet of Ensigns and will themselves operate two services a week between Croydon and Calcutta.

At the party there were officers and others from four Dominions and India, and three of the little group of pilots who have each flown more than a million miles in the service of the company.

A good deal has been said from time to time about the growth of Imperial Airways, but it is still interesting to know that the fleet, the mileage, and the passenger traffic have each increased sixfold since the company was incorporated on April 1, 1934, while the amount of mail has, as might be expected, increased by thirty-four. Imperial Airways' fifteenth year should be in many ways its most interesting.

The Final Six

The last of the six boats ordered by Qantas Empire Airways, *Cooee* (VH-ABF), made her first service flight on April 1. This means that only six more boats of the Canopus class remain to be delivered—to replace those taken out of the Imperial Airways order by Qantas.

As a matter of interest the names of these six are: *Cheviot, Coolin, Calpe, Cairngorm, Champion,* and *Cotswold*. The next group of civil boats to go down the slipway at Rochester will presumably be the Mark II machines, which are designed to carry a greatly increased payload and are for use on the Atlantic, the Tasman, and, eventually, the Pacific services.

Mails to Holland

Operating as sub-contractors of British Airways, International Air Freight have, since March 28, carried the early morning letter mail between London and Amsterdam by their service which leaves Croydon at 6.30 a.m., and in future, as explained in last week's issue, late letters will normally be delivered in Amsterdam on the same afternoon. Previously, letters for Amsterdam posted up to 6 p.m. at the head office were sent by night air service, and those destined for the rest of Holland went by the Harwich-Hook steamer service. In either case they were delivered in Amsterdam, The Hague, or Rotterdam by the first delivery next morning. Letters posted too late for the night mail, however, were sent by the Harwich-Flushing steamer service next morning. The new service, therefore, will effect a saving of as much as eighteen hours in the case of the day mail. I.A.F. are also carrying air parcels to Holland.

The New Leo Boats

The first of the five Liore et Olivier 47 flying boats with four Hispano Suiza 12 Y engines of 910 h.p. (max.) each, which are being built for Air France for South Atlantic work, is nearing completion in the workshops of the S.N.C.A. at Vitrolles, on the Etang de Berre, Marseilles. Latest reports state that the wing is now fitted to the hull and that the boat will be able to make its first flight before the end of this month.

These machines are of particularly clean design in view of their 17-ton weight and have a top speed of 220 m.p.h. Their eventual use will break the long spell of exclusively landplane South Atlantic crossings of the past few months. The prototype went through all the tests in brilliant style at Ste. Raphael last year and should have been in service now but for an unfortunate accident which resulted in its total loss during a flight at Antibes on May 19 last year. So satisfied were Air France with the tests that they placed an order for five and have done their best to speed up delivery.

HERE and THERE

News of the Week

Major Cordes Married

MAJOR J. B. L. H. CORDES, chief test pilot to Handley Page, Ltd., was married at Caxton Hall, last Saturday, to Miss Muriel Greenwood. A reception at the R.A.F. Club, Piccadilly, indicated how universally popular Jim Cordes is in the aircraft industry. Major and Mrs. Cordes are spending a touring honeymoon before settling down in their new home at St. Albans.

The £100 Aeroplane Again?

A NEW company will shortly open a factory at Shoreham Airport with the idea, apparently, of manufacturing the long-considered £100 aeroplane, which, in this case, will be a low-wing pusher monoplane with a converted Ford engine. Its cruising speed is given as 75 m.p.h., and the prototype is almost ready for first tests. Capt. S. H. Gaskell is the managing director of the company.

New Regulations

APART from the amendment which has already been noted concerning the fitting of a tail parachute for all C. of A. spinning tests, the 1938 Air Navigation Regulations, which have now been published, involve one or two other important changes which are briefly detailed in *Notice to Airmen, No.* 52.

Among these other changes is an order requiring that all machines used for night flying should have adequate electrical illumination for the instruments and maps; the inclusion of one blind take-off in the "B" licence instrument flying tests; and a few amendments concerning the services on which a qualified navigator should be carried, and the medical requirements for transport and "A" licences.

The New Stinsons

DETAILS of the new Stinson Reliant S.R.10 Series, which are distributed in this country by Brian Allen Aviation, of Croydon, have recently come over from the States. The major improvements are a rather cleaner fuselage, a hinged engine cowling, which may be raised on either side for engine inspection, and an improved braking system. Other new features include shock absorbers with a longer stroke, improved vision in all directions from the pilot's seat, a simplified instrument panel, built-in radio (when specified), and a slightly larger baggage compartment.

The Isle of Man Races

FOLLOWING last year's minor contretemps with fog on the Isle of Man coast, a change has been made in the rules for this year's London-Ronaldsway race. It will no longer be necessary, for instance, to make for Maughold Head, and the finishing point will be at the aerodrome itself. Last year, it will be remembered, the finishing line was across the front at Douglas, and pilots had to descend below four hundred feet and then climb up again over Douglas Head—a rather too entertaining process.

The main race, as previously explained, will be held on June 4, and the Manx Air Derby and the Tynwald race will be held on June 6. There will be a naval patrol between St. Bee's Head and the Isle of Man on the day of the long-distance event. Capt. Rex Stocken is, as before, the organiser. His address is 109, Jermyn Street, London, S.W.1.

"A" Licence Instructors?

WHETHER "A" licence pilots of adequate proficiency should be allowed to give flying instruction was among the questions debated at the recent meeting of the General Council of Associated Light Aeroplane Clubs. It was decided to address a questionnaire on the subject to all clubs, and to discuss the result with the Guild of Air Pilots and Air Navigators.

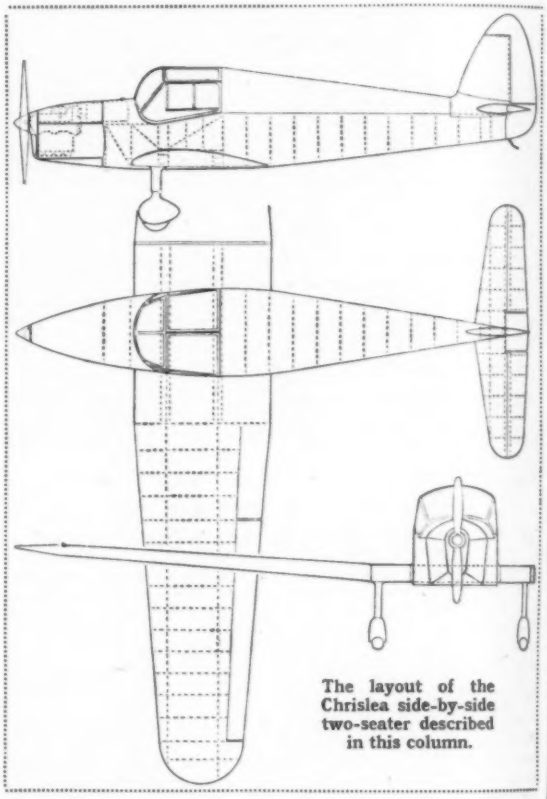
Among other questions discussed was that of army co-operation flying, which, it will be remembered, was the subject of a recent prosecution involving a club. The secretary stated that, after enquiries, it was quite clear that such flying came under the category of "aerial work" as defined in existing Air Navigation Regulations, and that consequently aircraft used for the purpose must be piloted by "B" licence pilots.

The council, while agreeing with the principle of employing "B" licence pilots, considered that nevertheless it might be possible for clubs to assist in such flying with "A" licence pilots, and the matter was referred to a sub-committee.

Another Mediumweight

THE already large number of medium-light and ultra-light machines which are either in the design or the prototype stage has recently been increased by one—the product of the Chrislea Aircraft Co., Ltd., of 61, Goldney Road, London, W.9.

This machine, which is in process of construction, is a side-by-side two-seater low-wing monoplane on fairly conventional lines, with simple, manually operated half-span flaps and folding wings. The undercarriage, which is of the cantilever type, is attached to the front spar of the stub wing and the shock is taken by compression rubbers. The machine is mainly of spruce and plywood construction, with welded steel for such parts as the engine mounting and undercarriage attachments. It is stressed for aerobatics and is primarily designed for club and private-owner use. The price has not yet been settled, but in the word of the designer this will be "attractive."



The layout of the Chrislea side-by-side two-seater described in this column.

The engine to be fitted is the Walter Mikron Mark II of 62 h.p., and the Chrislea Aircraft Co., Ltd., tell us that they have obtained the sole rights for the manufacture and distribution both of this engine and of the Mark I model.

The provisional specification of the Chrislea monoplane is as follows: Weight empty, 640 lb.; all-up weight, 1,125 lb.; maximum speed, 118 m.p.h.; cruising speed, 110 m.p.h.; landing speed (flaps down) 36 m.p.h.; rate of climb, 650ft./min.; and range 450 miles.

"Running" Commentaries

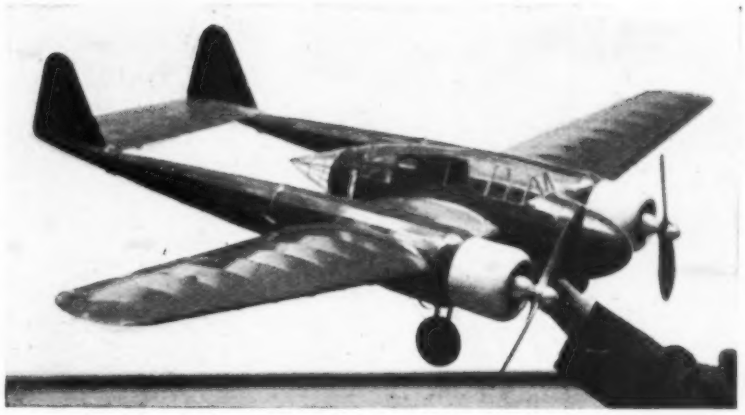
DR. W. HELMORE, M.Sc., Ph.D., a Cambridge scientist, who has for some years been carrying out private research on fuels and oils, explained to an interested gathering in London last week the technical features of the new lighter Patent Castrol—a car engine lubricant designed to combine the advantages of a light, quick-flowing oil with those of the heavier lubricants, and to have the disadvantages of neither.

His exposition was both accurate and bright, as befits one who can broadcast an account of a Schneider Trophy Race, as Dr. Helmore (or Sqn. Ldr. Helmore, as we knew him then) used to do.

MODELS

A Twin-fuselage Fighter After a Famous Prototype : Competition News

By M. R. KNIGHT



Everyone familiar with the appearance of the Fokker *Faucheur* — illustrated several times in *Flight*—will acknowledge the accuracy of Mr. H. J. Towner's model.

A Miniature "Faucheur"

FOLLOWING successful flying scale models of the Hornet Moth and the Heston Phœnix, Mr. H. J. Towner, of the Brighton District M.A.C., has achieved promising results with a magnificent miniature edition of the Fokker *Faucheur* mid-wing fighter. As will be seen from the photograph, the departure from true scale dimensions is negligible. This represents a very real achievement, since the weight of the "motors" cannot be localised as in the prototype, and automatic stability has had to be incorporated. Built to the standard S.M.A.E. scale of 1in. to 1ft., the span is 54 3/16in., the wing area 306 sq. in., and the length 34in. With a total weight of 17oz., the wing-loading works out at 8oz./sq. ft.

To facilitate transport to the flying field, the model has been constructed in six detachable units. The short fuselage or nacelle, the two centre sections of the wing, and the forward portion of each motor boom constitute a single unit. Birch dowels projecting from the sides of the motor booms plug into paper tubes in the outer wing-panels. The central portion of each boom is attached to the forward portion by means of dowels, and the rear portions of the booms, constructed integral with the tailplane and fins, are attached by means of plugs, which carry the rear rubber-hooks, and push into the end bulkheads in the central portions of the booms. Small wire hooks and rubber bands hold the units securely in position.

The nose of the nacelle consists of bulkheads and stringers, with the spaces between the latter filled with 1/8in. balsa, the whole being sandpapered to the correct shape. Eight stringers and numerous bulkheads form each oval-section boom. Each motor cowling is formed from 1/16in. balsa sheet, and an 1/8in. hardwood 3-ply bulkhead with its centre cut away to accommodate the front half of the crankcase, the latter serving as a nose-piece and carrying the airscrew bearing. Left-hand and right-hand airscrews, 10in. in diameter, are employed, each turned by a single skein of rubber, which, to secure a correct c.g. placing without adding dead weight to the nose, extends for only two-thirds of the length of the motor boom. To avoid fouling the rubber skeins, the undercarriages have not been made retractable. They are hinged in front, and the rearward and upward movement is controlled by rubber bands. Both fins are fixed, and steering is effected by hinged ailerons. The elevators are also made adjustable.

The entire model is covered with Japanese tissue, doped, and finished with dark olive green cellulose paint, with the exception of cream cowlings, and aluminium crankcase fronts.

Only comparatively short flights have yet been attempted, during which stability appeared to be of a high order.

Women Engineers and Models

MODEL aeronautics and the Society of Model Aeronautical Engineers were the themes of a lecture delivered to the Women's Engineering Society on March 2 by Mr. J. C. Smith (S.M.A.E. Competition Secretary), Lt.-Col. J. T. C. Moore-Brabazon, M.C., M.P., presiding. Interesting points from the lecture were that the building of model aeroplanes and gliders now formed part of the curriculum of German schools, probably half-a-million boys participating, that the model flying movement was being sponsored by the Danish Government, and that Sweden could boast over 50,000 modellists.

Later Dr. A. P. Thurston took the chair, and called upon Mr. R. N. Bullock to deal briefly with the technical aspect.

Sundry representative models were on view, including the highly efficient shoulder-wing model with which Mr. Bullock secured second place for Great Britain in the 1937 Wakefield contest, the Viper intercepter fighter of Mr. C. R. Moore (described in *Flight* of March 4, 1937), and a high-wing model with 9 c.c. two-stroke by Mr. R. J. Trevithick, this model having a device for altering the fin setting when the motor cuts. A microfilm-covered indoor model weighing half an ounce was demonstrated by Mr. R. Copland, and captive flying by a small model tethered by a wing-tip to a pole was carried out by Mr. Bullock.

Interesting facts emerged from the subsequent discussion. Mr. Robert Kronfeld mentioned experiments with free-wheeling airscrews on full-scale aircraft, and suggested that the idea be tried on models, only to learn that this had been a standard fitment for years. Mr. A. R. Hafner advocated rotating-wing and helicopter models, and seemed surprised to hear that model Autogiro contests had been held, and that a helicopter model had flown successfully before the war. Capt. Norman Macmillan, M.C., and Miss Amy Johnson also addressed the meeting.

The 1938 Contests

THE S.M.A.E. has just issued a most useful handbook, dealing principally with the numerous outdoor contests arranged for 1938. These include the contest for the Wakefield Cup, to be held in France on July 31, the eliminating trials at Fairey's on July 3, a contest for flying-boats, a seaplane contest for a cup presented by Short Bros., and a speed contest for the *Flight* Cup.

The book also contains a foreword by Lord Wakefield, patron of the Society, a list of 54 affiliated clubs, rules governing record attempts and the flying of petrol-models, details of records recognised by the Federation Aeronautique Internationale, a list of British record flights, photographs of sundry trophies, and Wakefield entry and record claim forms.

Readers who are interested, but not yet actively connected with the model flying movement, would do well to obtain a copy and visit some of the contests mentioned. The performance of the modern model would doubtless surprise them. Copies can be obtained at 4d. each, plus 1½d. for postage, from E. F. H. Cosh, hon. secretary of the S.M.A.E., 35, Maple Crescent, Sidcup, Kent.

"Northern Heights" Gala Day

THE Northern Heights Model Flying Club will hold their 6th annual Gala Meeting on Sunday, June 19, from 11 a.m. to dusk. The occasion is invariably productive of a huge muster of models and model builders from far afield, and is well worth the journey to the Great West Aerodrome. No fewer than ten contests will be held, among the model types catered for being flying scale-models (for which the *Flight* Cup is offered), pusher models, seaplanes, "semi-scale" models, and biplanes. There will be a seaplane competition for women, and the S.M.A.E. women's contest will also be held. Further details can be obtained from the organiser, Mr. C. A. Rippon, 58, Hampden Way, Southgate, London, N.14.

* * *

During one of the flying meetings held by the S.M.A.E. at the Royal Albert Hall during the winter an indoor "spar" rise-off-ground record of 3 min. 36 sec. was set up by Mr. Brown, of the Blackheath Model Flying Club. The model was of the microfilm-covered type.

* * *

Mr. Reginald Denny, the film actor, is part-designer of a successful radio-controlled petrol model, which is to be used as a target for U.S. artillery. A speed of 60 m.p.h. and a ceiling of 9,000ft. are claimed.

THE INDUSTRY

New Address

AERONAUTICAL consultants and aerodrome equipment agents, the Lindsay-Neale Aviation Co., Ltd., have now moved into new premises at 4, Park Lane, London, W.1 (Mayfair 8627-8)

Major Darwin Resigns

MAJOR C. J. W. DARWIN, D.S.O., has resigned his post as managing director of Saunders-Roe, Ltd., of Cowes, Isle of Wight. Messages sent to him at his London address, 10, Montagu Mews, London, N.W.1, will find him. The telephone number is Welbeck 1526.

Pioneer Seeks Post

AFTER three years in the Bureau of Information of the National League of Airmen, Mr. L. Howard Flanders is seeking a post, the League having been closed down. Older readers of *Flight* will not need to be reminded that Mr. Flanders was one of Britain's pioneer aircraft designers, working at Brooklands from 1909 to 1914. He has had wide experience of secretarial work in connection with clubs and societies and is now looking for a post of that nature in which his intimate knowledge of British aviation from the earliest days should be of considerable value.

Retractable Triple Alliance

THERE is, perhaps, some doubt as to which firm should take the credit for the vast retracting undercarriages of the A.W Ensign.

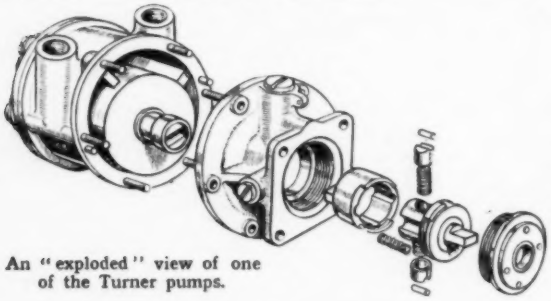
Actually, the honours are shared. We understand that Armstrong Whitworth manufactured the oleo legs while Automotive Products, of Leamington, supplied the Lockheed hydraulic retracting gear. The undercarriage is operated by a hydraulic jack carried entirely by the retracting strut, and this is a patent of Aircraft Components, Ltd., of Cheltenham.

Incidentally, the last-named concern state that they, also, have built 7ft. undercarriage jacks—three years ago, for the Monospar Croydon.

Instrument-drive Pumps

A RANGE of rotary vacuum pumps for instrument operation is being manufactured by Turner's Motor Manufacturing Company, Limited, Wulfruna Works, Moorfield Road, Wolverhampton. The pumps are made in various sizes and capacities, and are designed for the operation of such instruments as the turn-and-bank indicator, directional gyro and artificial horizon.

All these pumps are of the type in which a rotor, mounted eccentrically with the body, is fitted with blades or vanes. Smaller pumps have a single blade and larger ones double blades. Throughout their movement the blades are in contact with the inner diameter of the pump body, and this contact is further ensured by the insertion of special sealing strips in grooves formed in the edges of the blades.



An "exploded" view of one of the Turner pumps.

At gliding speed, with the engine running at about 1,000 r.p.m., the pump illustrated has a capacity of 3.5 cubic feet and 4in. vacuum. This is adequate to operate the instruments and the pumps may be run up to 4,000 r.p.m. In order to obtain satisfactory results at all times, in view of the wide range of the pumps, a special relief valve is incorporated in the system, and this is included in the pipe line from the instruments to the pump.

Usually, the pump is mounted direct on the engine, and oil is fed at normal engine oil pressure through holes in the flange. The pump is not flooded with oil from the engine; the oil is metered into the pump through a special arrangement of passages. An oil separator can be supplied, where necessary, for reclaiming oil which passes through the pump from the engine.

In construction, the pump body contains a rotor fitted with single or double vanes. These vanes follow, without the aid of springs, the internal contour of the pump body. The rotor is driven through the medium of a special coupling in which a cush drive is incorporated.

In the double-vane type there are two sizes, and the end flanges of each are interchangeable. Incidentally, this vacuum pump can be used for de-icing equipment.

As an indication of the reliability and efficiency of the pumps, it may be mentioned that they are standard equipment on Short Empire flying boats and were used on *Caledonia* during her transatlantic flights last year.

Company Meetings

THE British Aluminium Company announce that their net profit for 1937 is £549,340, as compared with £361,158 for 1936. The directors recommend a final dividend of 8½ per cent. on the ordinary shares, making 12½ per cent. for the year.

* * *

The British Thomson Houston Co., announce a gross profit for 1937 of £651,673, compared with £553,714 in 1936.

* * *

At the adjourned general meeting of Boulton Paul Aircraft, Ltd., held in London recently, Lord Gorell (the chairman) said that the trading profit for the year under review was £20,411, as against £5,759 for the previous year. It was necessary to look upon the period under review as one of continual expansion and growth, so the result could not be considered as other than satisfactory, particularly when it was possible to say that the whole of the former fixed-price contracts had now been completed.

The extension in floor space to the factory has been successfully completed with the minimum of interference with production, and, as the possibility of such expansion was contemplated in the original design of the factory, the enlarged premises now presented a homogeneous unit.

They had production orders in hand and in immediate prospect which should keep them working at full capacity at least till the end of 1940.

* * *

"Both works have been fully employed, and considerable additions have been made to the plants," said Mr. A. A. Jamieson (chairman, Vickers, Ltd.), speaking of Vickers (Aviation), Ltd., at the meeting of the parent company in London last week. Aircraft profits for the year were moderately satisfactory. In technical development they had achieved great success.

* * *

Thos. Firth and John Brown, Ltd., report a total dividend payment for the year of 17½ per cent. At the general meeting it was reported that new items in the wide range of steel products included ground-thread taps and high-speed carbide cutting tools while the firm had equipped themselves to undertake the boring of jigs for use in engineering production.

"Cellophane"

IT frequently happens that a firm which has pioneered the manufacture of any particular article or substance finds that its registered trade name for that substance comes to be used as a "household word" applied indiscriminately to the genuine article and imitations alike.

An example is that word "Cellophane." The makers, British Cellophane, Ltd., St. Martins-le-Grand, London, E.C.1, point out that the name is a registered trade mark denoting their own transparent cellulose sheet and film.

Publisher's Announcement

EASTER HOLIDAYS

MISCELLANEOUS Advertisements intended for the issue of April 14 must be in our hands by first post on Monday, April 11.

The issue will be on sale one day earlier, *i.e.*, on Wednesday, April 13.